AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

JULY 15, 1950

In This Issue . . .

A CHILTON PUBLICATION

for FASTER-FASTER-FASTER flow of production line parts

New Way-Type Bore-Matic doubles production and provides precision alignment for multiple borizing of cylinder blocks.

The Model 231 Bore-Matic shown above (actually two way-type units in tandem) is arranged to bore valve guide holes and generate valve seats simultaneously. Concentricity and alignment are therefore automatic and infallible. A five-station, hydraulic transfer fixture presents the work in sequence to the two sets of four boring-heads. Damped quills are used to assure better finish and prolong tool life. And completely borized cylinder heads come off the machine in half the time of the previous method.

Way-type units, adapted to conveyor-type production lines, can be arranged to meet virtually every requirement for high-speed, multiple borizing.

combine operations on a versatile Heald Bore-Matic

When one machine can do the work of two or more—when one operation can replace several—that's real economy! It means faster production with greater accuracy. It means lower cost per part, with less capital investment.

Savings like this are routine with versatile Heald Bore-Matics. Multiplicity of tooling and flexibility of machine cycles and fixture arrangements spell faster, more economical production every time.

Remember—when it comes to precision finishing, it pays to come to Heald.

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

HEALD

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

WAUKESHA ENGINES

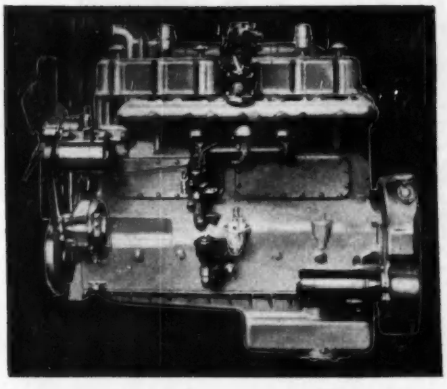
● Who's going to wait for the morning milk? Not the babies and small children—it's their breakfast. Not the big folks—it's the cream in their coffee.

And they don't wait—in Chicago. Grade A milk from the Waukesha County farms of the Hawthorn-Mellody Farms Dairy, Inc. of Chicago is rushed to the city by the corporation's Available Truck trains.

It's a 100-mile run—but there's nothing slow or pokey about this milk run. These trucks highball right along. Powered by Waukesha High Output Engines they maintain fast streamliner schedules, winter or summer.

Two Waukesha products—milk and engines—both Grade A.

The Waukesha 145-GKB High Output Engine is of the valve-in-head type—a rare combination of extra power plus extra speed, with rugged reliability. Specially designed for this kind of work, with . . . 7-bearing, 3½-inch crankshaft fully counterbalanced . . . precision bearings . . . downdraft carburetion . . . overhead valves with Stellite seats . . . removable hardened, wet sleeve cylinders . . . aluminum pistons. Arranged for full electrical equipment and all modern accessories. Get Bulletin 1402.



WAUKESHA Model 145-GKB HIGH OUTPUT ENGINE — Six cylinders, 5¼-in. bore x 6-in. stroke, 779 cu. in. displ. Develops 240 hp. at 2400 rpm.

WAUKESHA MOTOR COMPANY • WAUKESHA, WIS. • NEW YORK • TULSA • LOS ANGELES

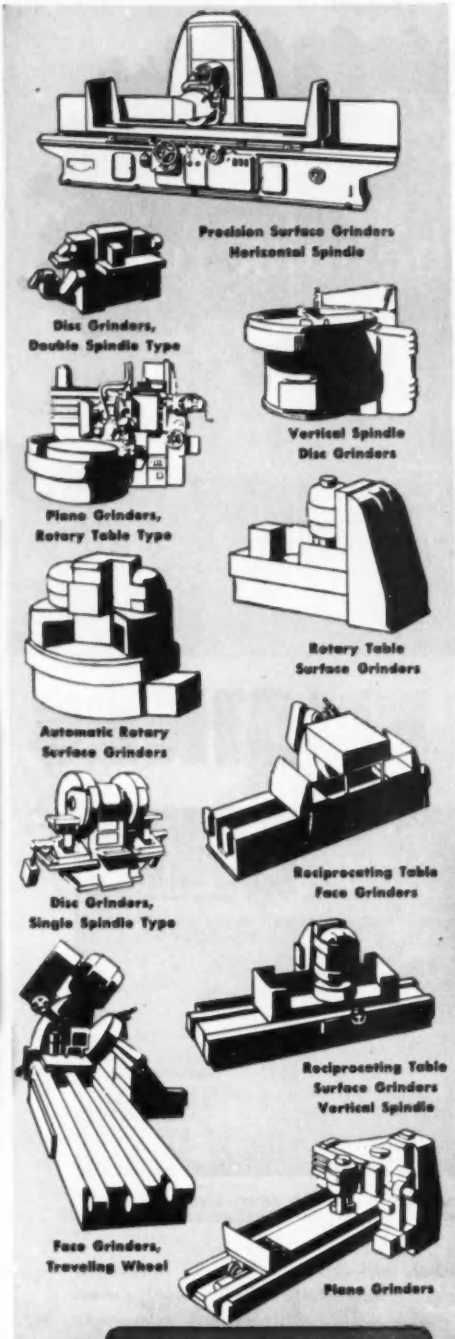
MATTISON GRINDERS

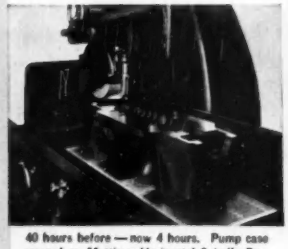
If its a Flat Surface to Grind
There's a Mattison to Grind it.

● With the addition of the production grinding machinery formerly made by the Hanchett Manufacturing Company, Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

For catalog on all machines, ask for free copy of general bulletin.





40 hours before — now 4 hours. Pump case ground on Mattison Horizontal Spindle Precision Surface Grinder

320 surfaces of cast iron compression heads per hour, removing 1/32" stock with Mattison No. 34 Rotary Surface Grinder

900 connecting rods per hour, using 40 station fixture to finish grind crank and wrist pin end of assembled rod with Mattison No. 72 Grinder

Shows variety of work run on Mattison Face Grinders

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

July 15, 1950 Vol. 103, No. 2

Contents

One of the Publications Owned by

CHILTON COMPANY (INC.)

Executive Offices

Chestnut and 56th Streets, Philadelphia 39, Pa., U. S. A.

OFFICES

Philadelphia 39, Pa., Chestnut & 56th Sts., Phone GRanite 4-5600
New York 17, N. Y., 100 East 42nd St., Phone Murray Hill 5-8600; Chicago 1, Ill., Room 916, London Guarantee & Accident Building, Phone Franklin 2-4242; Detroit 2, Mich., 1015 Stephenson Bldg., Phone Trinity 5-2090; Cleveland 14, Ohio, 1030 National City Bank Bldg., Phone CHerry 1-4188; Washington 4, D. C., 1091 National Press Bldg., Phone Sterling 1844, 1845 and 1846; San Francisco 5, Calif., 605 Market St., Room 606, Phone Sutter 1-4951; Los Angeles 1, Calif., 6000 Miramonte Blvd., Phone Lafayette 5525.
Cable Address .....Autoland, Philadelphia

Member: Audit Bureau of Circulations

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918

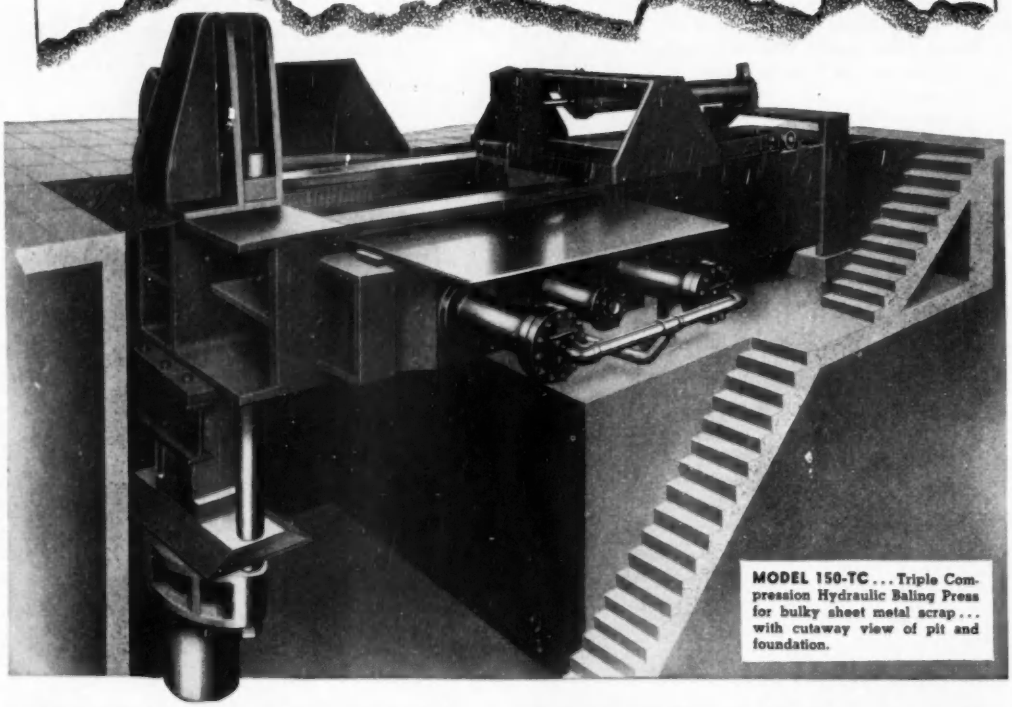
AUTOMOTIVE INDUSTRIES, Vol. 103, No. 2. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, 1 year $2.00, 2 years $3.00. Canadian and Foreign $5.00 per year; single copies, 25 cents, except Statistical Issue (Mar. 15th), $1.00.

INTEGRATE YOUR PLANT
by BALING your Sheet Metal Scrap

A well organized metal working plant which generates a volume of sheet metal stampings or clippings should include equipment for processing such scrap into compact bales of correct size and density for remelting. As such, it becomes valuable "raw material" in the production of new metal — sheets, strip, bars and ingots — and contributes to the conservation of natural resources.

A powerful hydraulic baling press . . . carefully engineered and ruggedly constructed . . . is essential to the orderly low-cost baling of your sheet metal scrap. Galland-Henning builds such balers in a range of sizes and capacities for every industrial need, and offers you competent, experienced counsel toward establishing an efficient, profitable baling operation in your plant. Write —

GALLAND-HENNING MFG. CO.
2747 SOUTH 31ST STREET • MILWAUKEE 46, WISCONSIN



MODEL 150-TC . . . Triple Compression Hydraulic Baling Press for bulky sheet metal scrap . . . with cutaway view of pit and foundation.

GALLAND-HENNING
SCRAP METAL BALING PRESSES

A 5660-1P

says the Project Engineer:

"WE LIKE TO DO BUSINESS WITH MUSKEGON"

". . . because Muskegon's testing and research facilities serve engine builders' interests exclusively."

Muskegon's assistance in designing, testing and perfecting piston rings for new engines and for replacement has played an important part in the automotive industry for nearly thirty years.

CHIEF ENGINEER:
"Our experience has sold me on Muskegon as a source for both production and service rings."

PURCHASING AGENT:
"Because Muskegon produces top quality piston rings economically, and we can rely on their delivery promises."

PARTS SALES MANAGER:
"Because Muskegon's unique sales policy enables them to work wholeheartedly with us without prejudice."

THEY ALL AGREE...

"we like to do business with Muskegon!"

PRODUCTION MANAGER:
"Because Muskegon anticipates our requirements and gives us unusually quick service."

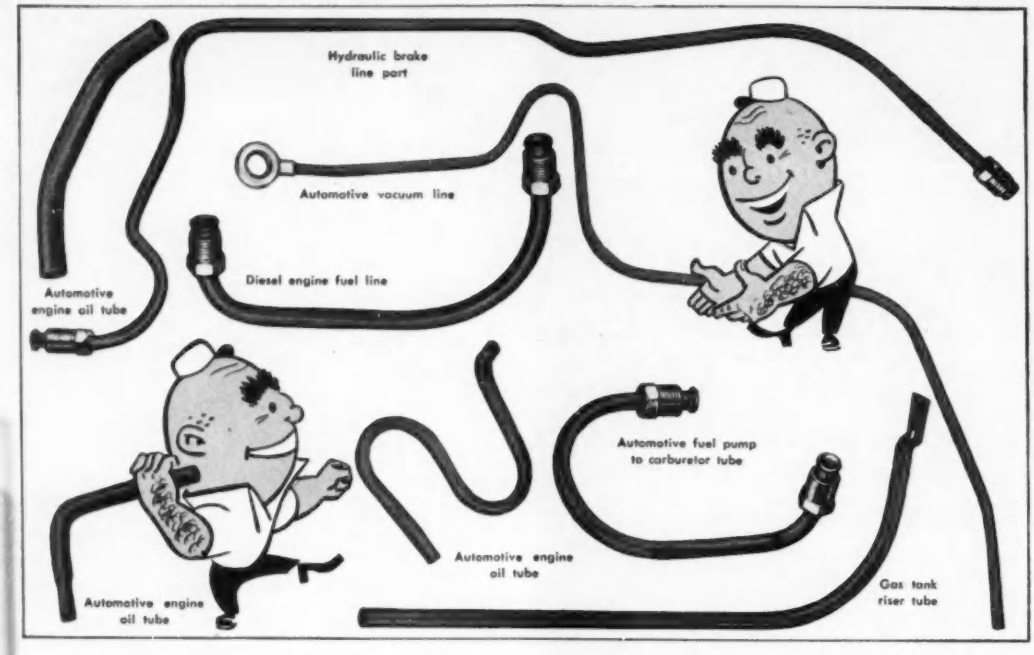
Policy

"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."

MUSKEGON
Piston Rings

MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"



What can't Bundyweld do in automotive tubing?

The answer is: **Nothing.**

There hasn't been an automotive tubing requirement yet, *no matter how intricate*, that Bundy hasn't been able to lick. The 8 completely fabricated, Bundy-designed pieces above are proof. Some are easy. Some are tough. But *all* are good because they're Bundyweld.

Bundy engineers start many bending jobs right from scratch, designing new fixtures when necessary. Endless inspection, constant checking make certain that each piece meets your *exact* specifications. No parts are shipped from the Bundy plant until they are perfect for your production job.

But all your Bundy bonus is not in Bundy bending . . . the tubing itself is good! Bundyweld's patented construction . . . double-walled from a single strip, copper-bonded throughout . . . makes it extra-strong yet ductile, lightweight, leakproof and highly resistant to vibration fatigue. In fuel lines, oil lines, brake lines, it's the *better* tubing.

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

Find out the full labor-, time- and money-saving story on Bundyweld today. ***Bundy Tubing Company, Detroit 14, Michigan.***

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

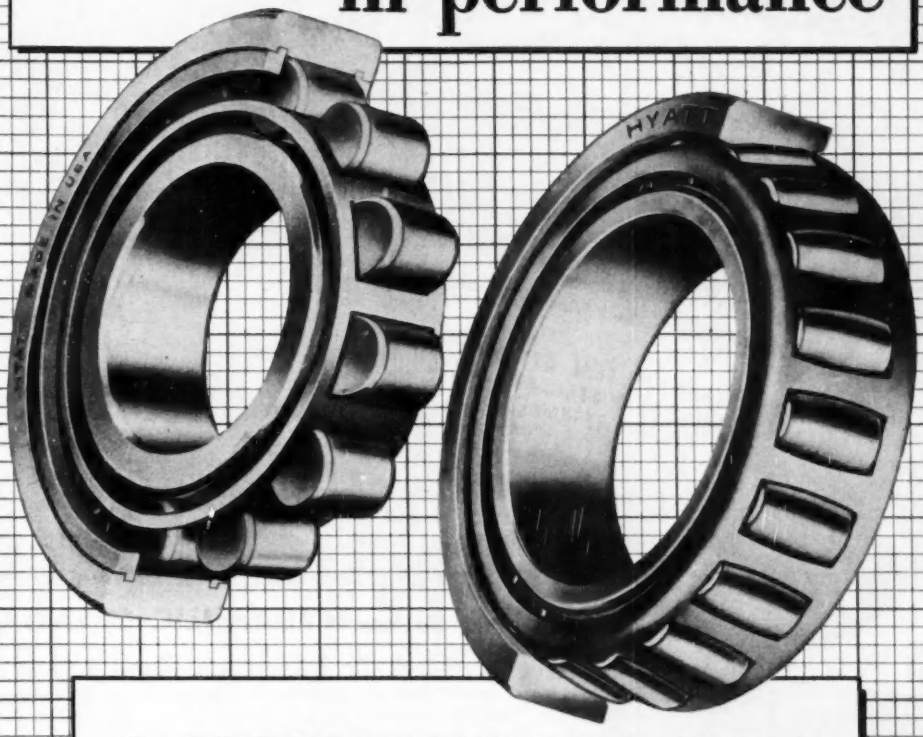
passed through a furnace. Bonding metal fuses with basic metal, presto—

Bundyweld . . . double-walled and brazed through 360° of wall contact.

NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: *Cambridge 42, Mass.:* Austin-Hastings Co., Inc., 226 Binney St. • *Chattanooga 2, Tenn.:* Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • *Chicago 32, Ill.:* Lapham-Hickey Co., 3333 W. 47th Place • *Elizabeth, New Jersey:* A. B. Murray Co., Inc., Post Office Box 476 • *Philadelphia 3, Penn.:* Rutan & Co., 404 Architects Bldg. • *San Francisco 10, Calif.:* Pacific Metals Co., Ltd., 3100 19th St. • *Seattle 4, Wash.:* Eagle Metals Co., 3628 E. Marginal Way *Toronto 5, Ontario, Canada:* Alloy Metal Sales, Ltd., 881 Bay St. • **Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.**

HYATTS *pay off* in performance

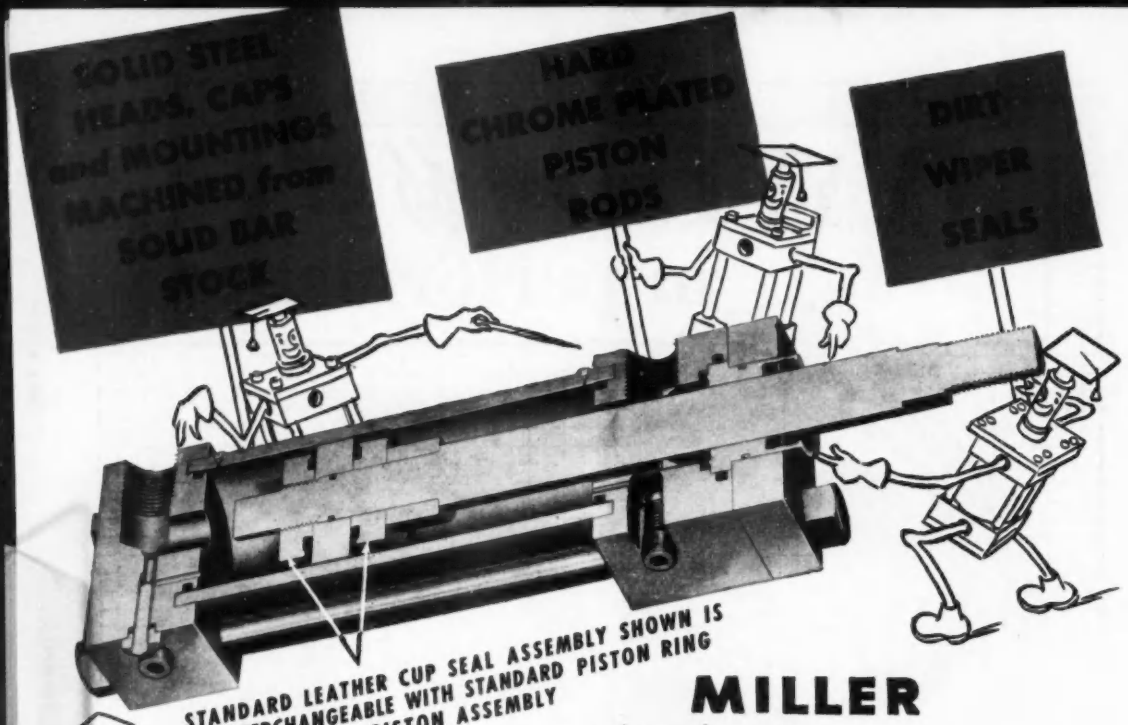


Hyatt Roller Bearings are purposely designed and built *first* to *last*.

Car, truck and bus manufacturers aware of this, also the ease of assembly and many other Hyatt advantages, write "Hyatt-Quiet" into their specifications, model after model.

And over the years, used by the millions, Hyatts keep on proving how well correct bearing design, precision manufacture and proper application pay off in performance. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey, and Detroit, Michigan.

HYATT ROLLER BEARINGS



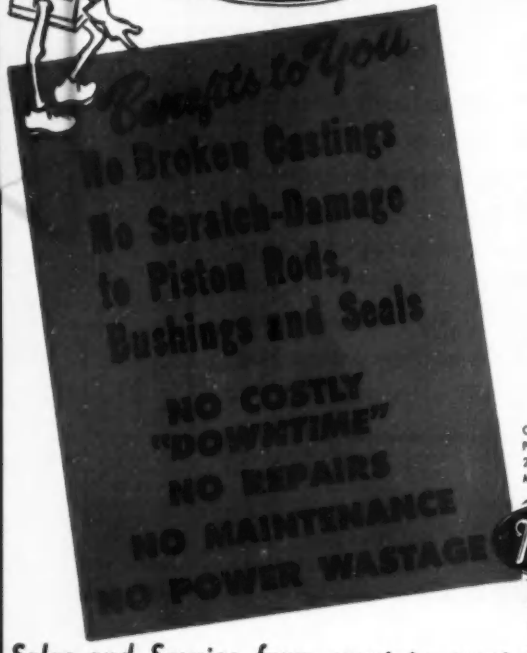
STANDARD LEATHER CUP SEAL ASSEMBLY SHOWN IS INTERCHANGEABLE WITH STANDARD PISTON RING PISTON ASSEMBLY

MILLER *High Pressure* HYDRAULIC CYLINDERS *Meet* J. I. C. HYDRAULIC STANDARDS

Years before the Joint Industry Conference (J. I. C.) Standards for specifying "quality" hydraulic equipment were adopted, the *standard* design and construction features of Miller High Pressure Hydraulic (2000-3500 psi) Cylinders already included ALL the specifications for cylinders, seals and pistons now called for by the "Standards". Hard chrome plated, scratch-resistant piston rods and dirt wipers have long been standard Miller cylinder features yet are required by the "Standards" only under severe conditions.

Solid steel heads, caps and mountings which eliminate costly, dangerous breakage even under the severest operating conditions represent an "extra-quality" standard Miller cylinder feature which actually exceeds the high quality set by the J. I. C. Standards.

The Miller "Patented" Hydraulic Piston Rod Seal which has no manual adjustment and is automatically self-adjusting and wear-compensating to give life-long leakproof service without ever requiring any manual adjustment whatsoever . . . far surpasses the requirement of J. I. C. Standard H6.2.5 which specifies "Stuffing boxes for automatic packing shall be so designed as to prevent adjustment beyond the functional limits of the packing"



Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

MILLER MOTOR COMPANY

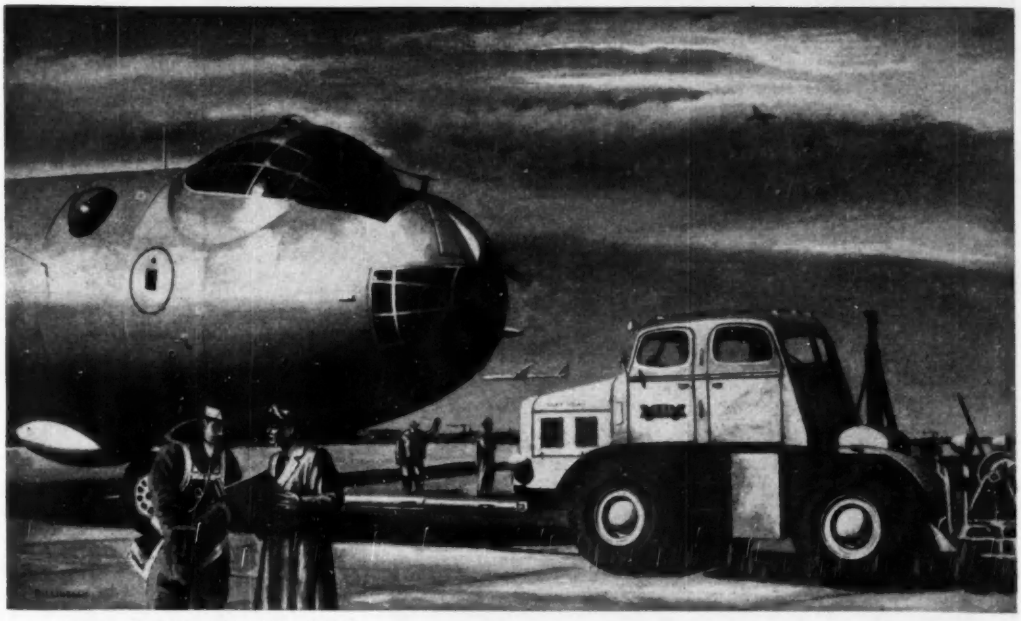
4031-33 N. KEDZIE AVENUE CHICAGO 18, ILLINOIS

AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · HOISTERS · AIR HOISTS

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON
HARTFORD — NEW YORK CITY — DAYTON — ST. PAUL — FORT WAYNE — INDIANAPOLIS
MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE
ST. LOUIS and OTHER AREAS.

Sales and Service from coast to coast

WHEN THE JOB IS *Tough*



THE COLEMAN TOWING "MULE" IN ACTION

ROSS BRINGS EASE . . . AND ECONOMY

PRODUCT of The American-Coleman Company, Omaha, Nebraska, the illustration above shows the Coleman "Mule," towing a plane at Carswell Air Force Base, Ft. Worth, Texas. This is one among dozens of unusual operations handled by vehicles equipped with Ross steering.

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

(1) ***Increased mechanical reduction*** . . . (2) ***More compactness*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency.***

Throughout 43 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Ross

Cam & Lever **STEERING**

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

whatever your job for synthetic rubber

In hundreds of industries, users of Acadia Synthetic Rubber component parts have found them unsurpassed. So, no matter what function synthetic rubber must perform in your plant, depend on Acadia parts. They best meet exacting specifications and operating conditions such as moisture, oil, heat, wear and age resistance. Molded, extruded, die-cut to close limits – compounded to meet specific conditions. Acadia engineers will gladly cooperate.

• Seals • Gaskets • Washers • Cups • Channel • Strip • "O" Rings
• Sheet • Tubing • Roll Goods • Cut Parts • Lathe Cut Washers

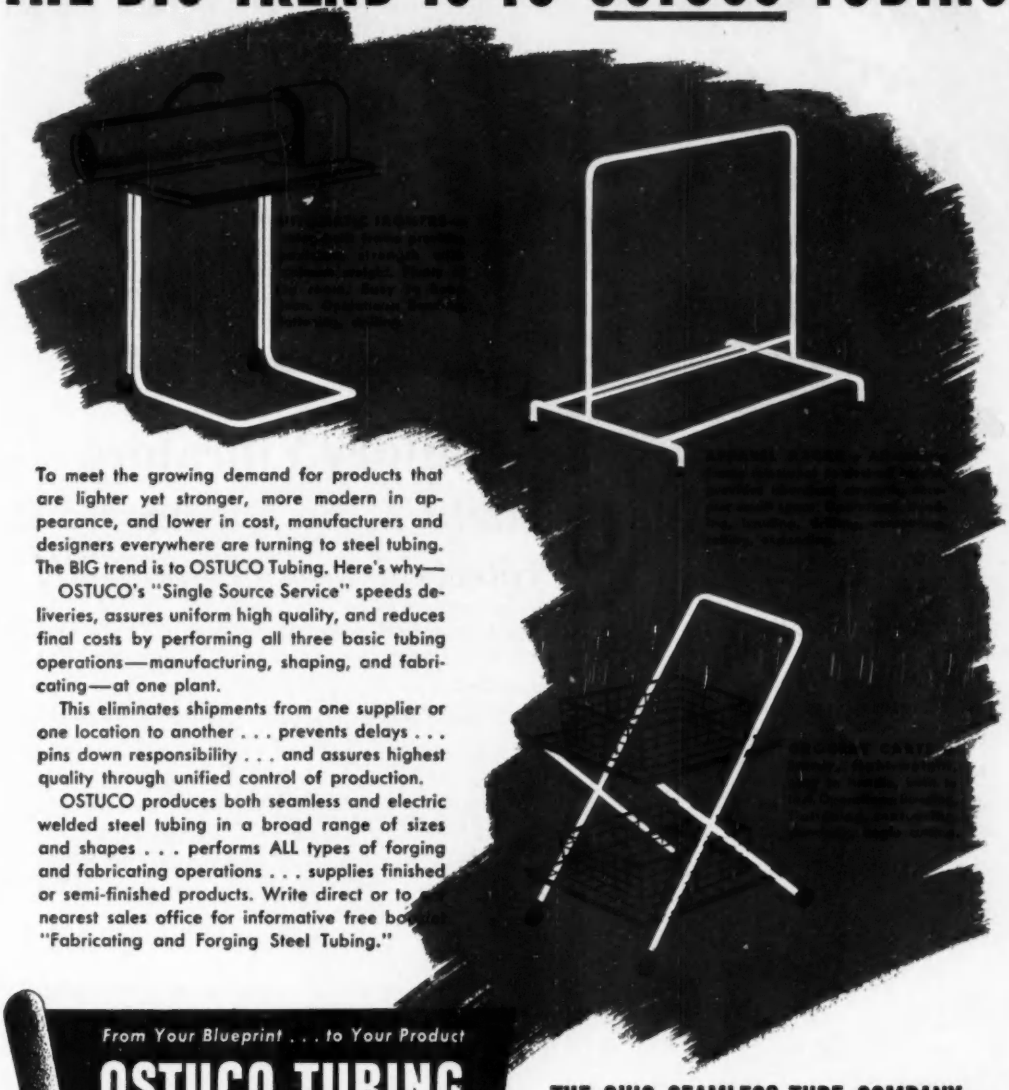
ACADIA *Synthetic* **PRODUCTS**

Processors of Synthetic Rubber and Plastics • Sheets • Extrusions Molded Parts

DIVISION WESTERN FELT WORKS

Branch Offices in All Principal Cities • 4035-4117 Ogden Avenue • Chicago 23, Illinois

THE BIG TREND IS TO OSTUCO TUBING



To meet the growing demand for products that are lighter yet stronger, more modern in appearance, and lower in cost, manufacturers and designers everywhere are turning to steel tubing. The BIG trend is to OSTUCO Tubing. Here's why—

OSTUCO's "Single Source Service" speeds deliveries, assures uniform high quality, and reduces final costs by performing all three basic tubing operations—manufacturing, shaping, and fabricating—at one plant.

This eliminates shipments from one supplier or one location to another . . . prevents delays . . . pins down responsibility . . . and assures highest quality through unified control of production.

OSTUCO produces both seamless and electric welded steel tubing in a broad range of sizes and shapes . . . performs ALL types of forging and fabricating operations . . . supplies finished or semi-finished products. Write direct or to nearest sales office for informative free bo "Fabricating and Forging Steel Tubing."

THE OHIO SEAMLESS TUBE COMPANY

Manufacturers and Fabricators of Seamless and Electric Welded Steel Tubing
Plant and General Offices: SHELBY 2 OHIO

SALES OFFICES: BIRMINGHAM, P. O. Box 2021 • CHICAGO, Civic Opera Bldg., 20 N. Wacker Dr. • CLEVELAND, 1328 Citizens Bldg. DAYTON, 511 Salem Ave. • DETROIT, 2857 E. Grand Blvd. HOUSTON, 6833 Avenue W, Central Park • LOS ANGELES, Suite 300-170 So. Beverly Drive, Beverly Hills • MOLINE, 617 15th St. NEW YORK, 70 East 45th St. • PHILADELPHIA, 1413 Packard Bldg., 15th & Chestnut • PITTSBURGH, 1206 Pinewood Drive • ST. LOUIS, 1230 North Main St. • SEATTLE, 3104 Smith Tower • SYRACUSE, 501 Roberts Ave. • TULSA, 114 East Fifth St. • CANADIAN REPRESENTATIVE: RAILWAY & POWER CORP., LTD., New Glasgow, Montreal, Noranda, North Bay, Toronto, Hamilton, Windsor, Winnipeg, Edmonton, Vancouver.

Mallory Vibrators

Roll Up Big Savings . . .
Protect Customer Good Will!

Reducing component parts costs—and at the same time, improving performance—is a welcome combination! The economy and dependability of Mallory Vibrators have made important contributions of this kind for Mallory customers.

Here's just *one* example! A radio manufacturer was receiving serious field complaints on vibrator performance. The substitution of two Mallory Vibrators—one a standard type, and the other especially designed for his problem—not only eliminated the difficulty but saved the customer $30,000 in vibrator costs alone! And the changes were accomplished with virtually no modification in circuit designs.

That's service beyond the sale!

And whether your problem is electronic or metallurgical what Mallory has done for others can be done for you.

MALLORY VIBRATORS

Mallory Vibrators are based on exclusive design and manufacturing methods that assure long, trouble-free service. Send the details of your application. Get Mallory's recommendation on the Vibrator or Vibrapack* power supply best suited to your needs.

Vibrators and Vibrapack* Power Supplies

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Capacitors	Contacts
Controls	Resistors
Rectifiers	Vibrators
Special Switches	Power Supplies

Resistance Welding Materials

*Reg. U. S. Pat. Off.

Bendix Products Division

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

TAKE ADVANTAGE OF THE TREND TO

HYDROVAC

THE WORLD'S FASTEST SELLING POWER BRAKE

Every day more and more commercial vehicle operators are turning to Hydrovac* as the final answer to their power braking problems. This unrivalled preference presents to manufacturers, whose vehicles are factory equipped with Hydrovac, a pre-sold market of vast proportions. Further, the millions of Hydrovac units in daily use furnish a potential service and replacement business that any alert dealer organization would welcome.

There is an added sales feature for the commercial vehicle manufacturer who standardizes on Hydrovac—the best proven and *most* popular power brake in the world.

*REG. U.S. PAT. OFF.

BENDIX · PRODUCTS DIVISION · SOUTH BEND

AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.
Canadian Sales: Bendix-Eclipse of Canada, Ltd., Windsor, Ontario, Canada

BUILDERS OF THE BASICS OF BETTER MOTOR VEHICLES

AUTOMOTIVE INDUSTRIES

AUTOMOTIVE INDUSTRIES
Reg. U. S. Pat. Off.

High Spots of This Issue

★ **For How Long the Tremendous Automobile Demand?**

Confident answers to this key question are here expressed by four eminent automotive manufacturing executives. Additional on-the-spot data gleaned by Detroit Editor Leonard Westrate, puts this article among your priority reading this issue. Page 30.

★ **A Progressive Machinery Replacement Program**

Instituted at Ford Motor Co. of Canada is an orderly and formal modernization program. Management decisions are based on analysis of old and outdated machines together with engineering cost studies leading to replacement recommendations. Setup of the program is described, page 32.

★ **Mexican Automobile Industry**

This first-hand report on the rise of the Mexican Automobile Industry has been secured by interview with the President of Mexico and other high ranking government officials. Additionally, leaders of the industry there have been helpful with facts and figures to bring you this "South of the Border" story. Page 34.

★ **GM 110 Diesel Engine**

The Detroit Diesel Division of General Motors Corp. has released engineering details on the production model being groomed for large earth-moving vehicles, for rail cars, and for marine and general industrial and oil-field applications. Descriptions and specifications begin, page 38.

★ **Sweat Cooling**

Sponsored by the U. S. Army Ordnance Dept., a study has been made by the California Institute of Technology, on cooling by injection of a fluid through porous walls. Test results and conclusions are presented, page 40.

★ **24 New Products Items And Other High Spots, Such As:**

The economics of lower alloy steels for high quality gears; the Fuller torque converter with unique aircooling arrangement; unusual boring machine setups for Ultramatic parts; effects of temperature on silicon rubbers; accessibility features of the Federal truck; wide use of shot for cleaning and peening; and an answer to the question, "Will the low priced car be turbine powered?"

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

Call us for steel

We ship quickly!

EVERY KIND IN STOCK

BARS, CARBON STEEL—Hot rolled and cold finished, rounds, squares, hex's, etc.

STRUCTURAL SHAPES—Channels, angles, I and H beams, etc.

PLATES—Sheared, U. M. and mill edge, many types incl. abrasion resisting, E-Z-Cut, etc.

SHEETS—Hot and cold rolled, many types and coatings, cut to exact sizes.

TUBING—Seamless and welded mechanical and boiler tubes

ALLOY STEEL—Low, medium and high carbon alloys, as-rolled, annealed, heat treated. Also tool steel, oil and water hardening.

STAINLESS STEEL—Allegheny bars, plates, sheets, tubing, pipe and fittings, etc.

INLAND 4-WAY SAFETY PLATE—For flooring, ramps, stair treads, product applications, etc.

REINFORCING STEEL—Bars and accessories, spirals, wire mesh, etc.

OTHER PRODUCTS—Babbitt metal, machinery and tools for metal fabrication

RYERSON STEEL

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

News of the AUTOMOTIVE INDUSTRIES

Vol. 103, No. 2 July 15, 1950

Ford Says 1950 Likely to Be Best Car Year in History

The prediction that 1950 will be one of the best years, and perhaps the best, for the automobile industry was made by Henry Ford II, president of the Ford Motor Co., on a visit to New Brunswick, Canada. Mr. Ford said that cars and trucks produced by his company this year may number between 6,750,000 and 7 million. An upsurge, started last January, was continuing, with the public spending more on cars than ever before.

K-F and UAW Sign Pension Plan Agreement

Subject to adjustment in case of amendment of the present Federal Social Security Act, a five-year agreement for an employe retirement plan providing overall pensions of $100 a month which may be increased as high as $125 per month for eligible employes with 25 years' service or more has been signed by the Kaiser-Frazer Corp. and the UAW-CIO.

MIGHTY NEW MACK

The new Mack A-40-T truck, shown here, is one of the new Golden Anniversary models ranging from 17,000 lb GVW to 40,000 lb GCW recently announced by Mack Trucks, Inc. (see page 17, July 1st AUTOMOTIVE INDUSTRIES). The A-40-T is powered by a new Mack Magnadyne 140-hp engine.

Model Changes to Start Within Few Weeks

Although model change time for the Big Three producers has been definitely set back from original plans, it is likely that at least three independents will go ahead with earlier plans to change models in late summer and early fall. At the moment it looks as though the order will be Packard first, followed by Nash and Hudson a few weeks later.

Nash Sees This Year's Net Close to Last Year's High

Nash-Kelvinator Corp.'s earnings in the fiscal year ending Sept. 30 are expected to closely approximate the record $26,229,930 reported last year, George W. Mason, president, stated recently. He predicted that Nash Motors' new Rambler line will account for about one-third of next year's production. Nash's output of approximately 140,000 cars in the nine months ending June 30 will be 31 per cent greater than in the like period last year.

Believe Price of Henry J. to Be About $1300

There is considerable speculation about the price that the Kaiser-Frazer Corp. will put on its smaller, lower-priced model, the Henry J. The general guess in Detroit is that the price will be around $1300 delivered to the customer, since a price tag any higher than that would bring the car too close to the lowest-priced Ford-Chevrolet-Plymouth.

Paris Car Show to Be Biggest Int'l Display in Europe

With 18 automobile manufacturers from the United States, the same number from England, the entire Italian industry, and all the German firms in production participating, this year's Paris automobile show, opening on Oct. 6, changes from its national status to the biggest international display in Europe. There will be one show for every type of vehicle from trucks to motorcycles, but as the Grand Palais in the Champs Elysées has become too small to meet show requirements, extra space has been secured in the permanent exhibition halls at the Porte de Versailles, about a mile from the main display. Truck chassis will be seen in the Grand Palais, but complete trucks and coaches will be sent to the overflow building.

May Car Sales Hit All-Time Monthly High

Bringing this year's sales to a total of 2,893,695 new units, May factory sales of new motor vehicles in the U. S. hit an all-time monthly high of 696,893 units, according to the Automobile Manufacturers Association. The

ANOTHER RAMBLER

This new all-steel, five-passenger, two-door Nash Rambler custom station wagon has wrap-around bumpers, new grille, and flowing hood and fender lines. Powered by a six-cyl engine, the new model, fully-equipped, is priced at $1808 factory delivered. The Rambler Convertible was described on page 42, April 15th AUTOMOTIVE INDUSTRIES.

best previous month was August, 1949, when factory sales totaled 657,664 units, and prior to this year, the 1929 first five months total of 2,679,511 vehicles was also a record. Exports of new vehicles during the month totaled 24,454 units as compared with 19,259 in April. However, total foreign sales this year are running behind the 1949 figures: shipments abroad in the first five months of 1950 totaled 101,787 units, or about 3.5 per cent of the year's total, while 140,185 new vehicles were exported during the same period last year.

Oldsmobile to Stop Producing Six-Cyl 76 Models

GM's Oldsmobile Div. has significantly disclosed that it intends to stop production of its six-cyl 76 series cars. Plant space and facilities will be used for production of the series 88 and 98 models powered by the eight-cyl engine. Concurrently, Oldsmobile has announced that it is going to launch a multi-million dollar expansion program at Lansing, Mich., to increase capacity for producing eight-cyl engines. Equipment and space in the Oldsmobile six-cyl engine plant will be utilized for the manufacture of eight-cyl engines. In addition, further plant expansion and rehabilitation at a cost of several million dollars is planned by Oldsmobile in its main plant at Lansing, Mich. The program will include a new steel storage and plant engineering building and expansion of fabricating facilities in Lansing.

California Truck-Trailer Show Draws Record Crowds

Profit-making and cost-cutting, with an accent on safety, were stressed at the Annual National Truck, Trailer and Equipment Show held in Los Angeles in June. The show drew a record crowd of 30,000 to the manufacturers' displays of the newest in everything from trucks, trailers and engines to rear-view mirrors, heavy-duty braking equipment, and blowout-proof tires. The major manufacturers and distributors of automotive, road building, construction, and material handling equipment were represented in the 200 exhibits, some of which had to be accommodated in an open-air area adjacent to the auditorium. "The transportation industry is concerned with moving the greatest amount of goods and moving them safely," was the keynote comment by M. D. Tubbs, general chairman of the show and president of the Automotive Council of Los Angeles, show sponsors.

Chevrolet Automatic Drive Output Passes 100,000

Chevrolet recently passed the 100,000 mark in production of its Powerglide automatic transmission. The unit had been in production less than six months when the mark was set. Output is now about 1100 units a day and will be stepped up to 2000 as soon as necessary equipment can be installed. The Powerglide transmission has 607 precision parts built to extremely close tolerances.

New Studebaker Engine Nearing Production

The new Studebaker V-8 engine is reported to be nearing production,

DODGE'S DIPLOMAT

Now in full production, the new six-passenger Dodge Diplomat in the Coronet series combines convertible styling with a permanent steel top. Its chromium framed side windows crank down out of sight as in a convertible, and the car has an extra large, sweep-around rear window. Gyro-Matic transmission is available.

probably in August or September. However, it will take several weeks to iron out production kinks and obtain volume output. Consequently it seems likely that Studebaker's 1950 model announcement will be much later than last year when it came in August.

Dodge Announces New Model Called the Sportabout

Chrysler's Dodge Div. has announced a new model called the Sportabout. Shown recently at the outdoor automobile show sponsored by the Detroit Automobile Dealers Association, the new car is described as an improved version of the Dodge Wayfarer sports roadster.

Nominate J. Calvin Brown to Head ASME

J. Calvin Brown, of Los Angeles, Calif., owner of the firm bearing his name in that city, has been nominated as the 1951 president of the American Society of Mechanical Engineers, succeeding James D. Cunningham, president of Republic Flow Meters Co., of Chicago. Mr. Brown heads a slate of new ASME officers, including four regional vice presidents and two directors-at-large, and since only one name is presented for each office, nomination is tantamount to election. Regional vice presidents nominated are: Henry Reginald Kessler, manager, Republic Flow Meters Co., New York; Stephen Dewey Moxley, vice president, American Cast Iron Pipe Co., Birmingham, Ala.; Dr. John T. Rettaliata, dean of engineering, Illinois Institute of Technology, Chicago; and Carl J. Eckhardt, (renomination) professor of mechanical engineering and superintendent of utilities, University of Texas, Austin. Nominated as directors - at - large: Lionel J. Cucullu, assistant to chief engineer, New Orleans Public Service, Inc., New Orleans, La.; and Harold E. Martin, district manager, the Babcock & Wilcox Co., New York.

May Machine Tool Orders at Four-Year High

The National Machine Tool Builders Association reports that new orders for machine tools reached a four-year high in May with shipments the highest since December, 1948. The high level of business is a continuation of an uptrend which started last November.

Army Places Large Orders for Trucks and Parts

Trucks and automotive spare parts constituted an outstandingly large part of recently-announced Army contracts. Reo Motors, Inc., has announced a new contract for the manufacture of about 3900 additional 2½-ton trucks at a total cost of approximately $24 million.

In addition, an Army order for 4000 2½-ton trucks, costing about $23,950,000, has been placed with the Studebaker Corp. It is stated that the truck to be built by Studebaker is of the same design as the new Reo 2½-ton military vehicle. The United States Ordnance Dept. has placed an order with Willys-Overland Motors for 8350 Jeeps, the aggregate cost of which will be $22,291,330.

Other truck orders placed by the Army are as follows: Fargo Motor Corp., Detroit, Mich., trucks, three-ton, 4 by 2 stake and platform, $273,972; International Harvester, truck, 1½-ton, 4 by 2 stake and platform, $3,821,709; L. B. Smith, Inc., Camp Hill, Pa., remfg. and modification of trucks, 2½ ton, 6 by 6 and 6 by 4, $737,438; and Chevrolet Motor Div., General Motors Corp., Detroit, Mich., 4 by 2, ½-ton trucks, pickup, carryall, $7,325,540.

Automotive spare parts contracts announced by the Army include the fol-

GAINS AND LOSSES IN U. S. NEW CAR SALES BY REGIONS

REGION	April 1950	March 1950	April 1949	Four Months 1950	Four Months 1949	Per Cent Change: April Over March	April, 1950 Over 1949	Four Months 1950 Over 1949
New England	20,181	26,853	23,137	96,236	77,023	+ 4.9%	+21.7%	+25.0%
Middle Atlantic	90,077	91,903	77,749	329,161	247,361	− 2.0%	+15.8%	+33.2%
South Atlantic	54,625	54,603	43,390	206,576	146,391	None	+26.0%	+42.3%
East North Central	116,635	122,934	95,289	432,798	334,842	− 3.5%	+24.6%	+29.3%
East South Central	22,254	28,170	19,368	94,105	69,097	−21.0%	+14.7%	+36.4%
West North Central	53,211	49,709	41,366	176,870	127,949	+ 7.1%	+29.0%	+48.2%
West South Central	39,619	47,695	28,760	169,066	100,561	−17.0%	+37.9%	+68.0%
Mountain	17,030	14,074	13,754	57,370	44,441	+21.0%	+23.6%	+29.1%
Pacific	47,613	59,944	48,125	191,482	135,516	−20.6%	− 1.0%	+41.2%
Total—United States	471,215	495,886	390,938	1,757,652	1,282,881	− 5.0%	+20.9%	+37.0%

Kelley Elected Secretary of Chrysler Corp.

Nicholas Kelley, Jr., has been elected secretary of the Chrysler Corp. to succeed R. P. Fohey, who has been granted an extended leave of absence because of his health. Mr. Kelley will continue to head the resident legal department of the corporation in addition to his new post of secretary. He has been associated with Chrysler for the past 15 years and has been resident attorney since Feb. 1, 1946.

Welles to Make and Sell Marmon-Herrington Coaches in Canada

Marmon-Herrington Co., Inc., Indianapolis, Ind., has completed arrangements whereby its new line of motor coaches will be built, sold and serviced in Canada by the Welles Corp., Windsor, Ont. The most recent addition to Marmon-Herrington's All-Wheel-Drive line is a passenger-cargo vehicle, known as the Ranger. This is a vehicle of the station wagon type, with an all-metal body. It is built around a standard Ford half-ton chassis, converted to All-Wheel-Drive, and powered by the 100-hp V-8 engine.

French Talbot Breaks Records in Le Mans Race

All records were broken when a six-cyl 273-cu in. French Talbot, driven by Louis Rosier and his son, covered a distance of 2112.66 miles (average 89.7 mph) in the annual Le Mans 24-hr road race. A similar car was second. The winner also broke the lap record at 102.83 mph. The previous records had been set by Bugatti in 1939, with an average of 86.8 mph. An English Allard, fitted with a Cadillac eight-cyl engine, finished in third place. A special Cadillac roadster, driven by Miles and Sam Collier, came in 10th with a distance of 1956.8 miles. There were 60 starters.

FLAT ON THE FLOOR

The 1950 Mercury line includes an improved station wagon with an interior designed to permit a flat floor surface from the rear of the driver's seat to the end of the tail gate by redesigning the center seat to a folding type, so that the seat back will fold flush with the rear floor, and providing a removable floor board for the inclined portion of the floor. New support arms permit the tailgate to be lowered and held in a horizontal position. Mahogany grained steel panels have replaced the exterior plywood panels.

lowing: Austin Metal Products, Detroit, Mich., $102,595; Oil Gear Co., Milwaukee, Wisc., $182,280; B. F. Goodrich Co., Akron, O., $434,117; Chrysler Corp., Detroit, Mich., $162,-325; Willys-Overland Motors, Toledo, O., $1,933,345; Timken Roller Bearing Co., Canton, O., $130,680; Northwestern Auto Parts Co., Minneapolis, Minn., $314,598; Cupples Co., Mfg., St. Louis, Mo., $149,150; Biederman Motors Corp., Cincinnati, O., $425,937; Diamond T Motor Car Co., Chicago, Ill., $598,523; Federal Motor Truck Co., Detroit, Mich., $102,080; L. E. Carpenter & Co., Wharton, N. J., $126,350; Telegraph Mach. & Tool Co., Pontiac, Mich., $113,-080; and Firestone Industrial Prod., Akron, O., $502,830.

Tire and tube orders placed by the Army follow: Lee Tire & Rubber Co., Conshohocken, Pa., $165,699; Goodyear Tire & Rubber Co., Akron, O., $202,-989; Cooper Tire & Rubber Co., Findlay, O., $349,869; Robbins Tire & Rubber Co., Tuscumbia, Ala., $169,-336; Mansfield Tire & Rubber Co., Mansfield, O., $623,100; and Truck Tire Sales Co., Akron, O., $289,260.

Other contracts disclosed by the Army are a $5 million contract to Cessna Aircraft Co., Wichita, Kans., to build 400 light planes; Cummins Engine Co., Columbus, Ind., spare parts for Cummins Engine Co., Inc., equip., $136,290; and A. J. Miller Co., Bellefontaine, O., ambulance, ¾ ton, 4 by 2, metropolitan, $263,027.

The Navy has listed the award of the following contracts: Bendix Aviation Corp., (Eclipse Pioneer Div.), Teterboro, N. J., oxygen regulators, $238,926; Hartzell Propeller Co., Piqua, O., club propeller test assembly and drawings $119,529; Marvel Mfg. Co., Caldwell, N. J., propeller balancing kits, stand assemblies, $66,539; and United Aircraft Corp. (Pratt & Whitney Div.), East Hartford, Conn., engines, $14,760,900.

The latest contracts listed by the Air Force are as follows: Wolverine Diesel Power Co., Detroit, Mich., type B-6B power plants, $284,253; Texas Engr. & Mfg. Co., Dallas, Tex., E-3 oxygen servicing trailer, $306,463, and modification of (3) C-97 aircraft, $231,408, and maintenance inspection on (60) C-54 aircraft, $1,655,119; Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., carburetor spare parts, $494,447, and carburetor spare parts and fuel system spare parts, $757,082; Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md., components for radio compass AN/-ARN-6, $105,347; Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicator altitude Gyro Type J-8, $2,244,553, and starter assy EP type 1416-58-G EP 1416-42-G direct cranking, $187,698; Boeing Airplane Co., Seattle, Wash., producibility study on B-47 type airplanes, $561,514; B. F. Goodrich, Akron, O., wheels and brakes, $199,651; Goodyear Tire & Rubber Co., Akron, O., wheels and brakes, $126,897; Curtiss Wright Propeller, Curtiss Wright Corp., Caldwell, N. J., installation and spare prop. assys. controls, spare blade assys. and spare parts for B-36 airplanes, $4,383,-623, and 22 prop. assy. and 22 slip ring housing assy. for support of C-121 aircraft, $275,160; Curtiss Wright Airplane, Curtiss Wright Corp., Columbus, O., overhaul of auxiliary power units type V32 D 2, $250.000; North American Aviation, Inc., Los Angeles, Calif., tanks, fuel, $376.068; Wright Aeronautical Corp., Woodridge, N. J., conversion and modernization of R-3350-23A engines to R-3350-57 AM engines, $1,000,000.

MAICO-MOBIL

The Maico-Mobil, produced by Maico in Plaeffingen near Tuebingen in Western Germany, is essentially a motor-scooter but its engine, as on a motorcycle, is located between the wheels. Steering is by means of a handle bar, and the gear shift is operated through rotation of one of the handles. The Maico-Mobile is powered by a 9.2-cu in. engine, which produces 6.5 hp and gives the vehicle a maximum speed of 52 mph.

INDUSTRIES

Ranger Engine Div. Now Fairchild Engine

The name of the Ranger Engine Div. of the Fairchild Engine and Airplane Corp. at Farmingdale, Long Island, New York, has been changed to Fairchild Engine Div.

Ford Expanding Functions of Service Department

The Ford Motor Co. is moving aggressively ahead with expansion of its service department. Scope of the service department has been greatly broadened to include several new functions, and three new assistant service managers have been appointed. They are Fred J. Schaefer, technical services; S. J. Rogers, product information; and J. B. Nicolls, training and merchandising.

British Gasoline Price Hike to Reduce Engine Size

The recent 50 per cent increase in the cost of gasoline on the English market will tend to reduce engine size, and will nullify the benefits of the annual £10 flat rate tax for new cars, states the British Society of Motor Manufacturers & Traders. Since 1947, when the flat rate tax was introduced, the average capacity of engines has increased from 85 cu in. to 103.7 cu in. This has benefited home users and has been a major factor in the success of automobile exports. With the higher cost of gasoline, attention will be focused on fuel economy, and the home demand will be for smaller engines. This result has been noted in France, where all automobile taxation is tied up in the cost of gasoline. The result is that piston displacement is kept low, weight is reduced to the lowest limit, and overdrives are featured.

Acme

VERSION OF THE VOLKSWAGEN

A streamlined version of the Volkswagen, the new Porsche 356 automobile is shown being inspected by bystanders. Standing at the right of car are the designer, Professor Ferdinand Porsche (left) and his son, Ferry. Powered by an engine similar to the one in the originla Volkswagen, this car has twin carburetors. According to the designer, it has a top speed of 90 mph and a gasoline economy of 30 mpg.

BIGGEST YET!

Recently completed by the Heil Co., Milwaukee, Wis. this dump truck, believed to be the world's biggest, was recently delivered to Pennsylvania for coal mine operation. Weighing 35 tons empty, the huge 28-cu yd body is activated by a Heil 2040 double-acting single-link, twin-arm hoist, capable of raising and dumping a full load in 20 sec. It is mounted on a specially-built, six-wheeled Sterling chassis with 163 in. wheelbase, 325-hp Diesel engine and chain drive.

GM Names Cramer as Head of Hyatt Bearings

Raymond H. Cramer has been appointed general manager of the Hyatt Bearings Div. of GM at Harrison, N. J. Succeeding the late H. O. K. Meister who died recently, Mr. Cramer has been works manager of the Hyatt Bearings Div.

National Steel Expands Great Lakes Facilities

The National Steel Corp. has entered an expansion program at its Great Lakes and Weirton operations, estimated to cost from $25 million to $30 million. An additional blast furnace will be built and the coke plant enlarged at Great Lakes so that the new furnace will have a capacity of 40,000 tons of pig iron a month. It is expected to be in operation by Jan. 1, 1952. The program also includes the enlargement of existing open hearth furnaces at the Weirton, W. Va. plant of the Weirton Steel Co.

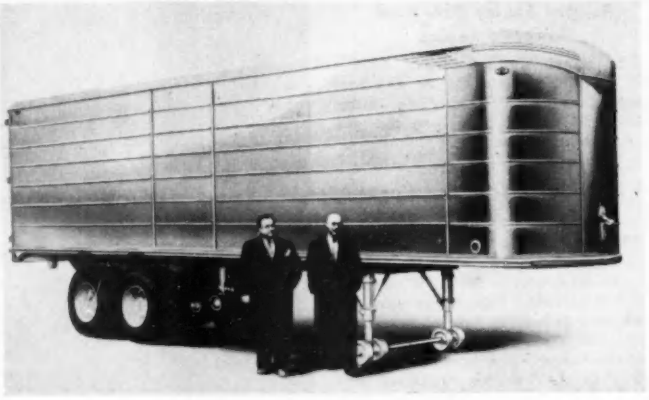
News of the AUTOMOTIVE

Federal-Mogul Branches to Carry Bower Bearings

According to the Bower Roller Bearing Co. and Federal-Mogul Corp., Bower roller bearings will soon be available to service outlets through the nation-wide branch facilities of Federal-Mogul Service, division of Federal-Mogul Corp. Federal-Mogul Service branches will carry stocks of the very complete Bower line of tapered roller bearings as well as Bower straight roller bearings.

Packaging and Materials Handling Show in Philadelphia

A materials handling classification has been added as part of the Fourth Annual Protective Packaging Competition, an annual feature of the Fifth Annual Industrial Packaging and Materials Handling Exposition, to be held in Philadelphia from Oct. 10-12, according to the Society of Industrial Packaging and Materials Handling Engineers.



ALUMINUM ADDITION

This aluminum aerovan is the latest addition to the Fruehauf Trailer Co.'s trailer line. A 32-ft model, weighing 9200 lb, it has the Fruehauf torsion tandem with forged aluminum wheels and gear boxes and vertical aluminum supports. Its underframing is also aluminum. Shown in the foreground are W. J. Robinson, vice president and director of sales and F. M. Reid, vice president in charge of engineering, who designed the new trailer.

620 Leyland Buses to Replace Havana Trolleys

Six hundred and twenty Leyland 40-passenger Diesel buses are to replace trolley cars in Havana. This $8,680,000 order is stated to be the biggest ever received by a British automobile concern. The Leyland buses feature an underfloor 125-hp Diesel engine flexibly mounted and incorporating anti-knock Aphonic fuel injectors. Engine, clutch and transmission form a unit which can be changed in less than 50 minutes. The bodies are built by the Saunders Engineering and Shipyard Ltd., an associate of Saunders-Roe Flying Boat Co.

HELPS THE POLICE

This new White 3000 truck with crane and wrecker body is being used by city police in Columbus, O., to tow parked cars off the streets. The wide front axle, short turning radius and short overall length make it easier to maneuver the new White into position for the towing operation.

Holley Carburetor Names Two Vice-Presidents

The Holley Carburetor Co. has announced the promotion of John C. Holley to vice president in charge of sales. He has been a member of the board of directors since 1946, and for the past year has been general sales manager. The company also announced the appointment of E. V. Moore as vice president in charge of finance. He was formerly executive assistant to the president, U. S. Steel Corp., and prior to that was assistant to the vice president in charge of finance at Willys-Overland.

To Hold 1951 Nat'l Air Races from May 19-20

The National Air Races, which for a number of years have been held over Labor Day at the Cleveland Airport, will be postponed until the weekend of May 19 and 20, 1951, to coincide with Armed Forces Day.

INDUSTRIES

GM's Output in June Sets New Monthly High

Setting a new monthly high for the company, GM produced 386,934 passenger cars and trucks in the United States and Canada during June. GM's June production compares with May output of 312,091 units. Of the total vehicles produced in June, 324,286 were passenger cars and 62,648 were trucks.

Dearborn Motors Announces New Moldboard Plow

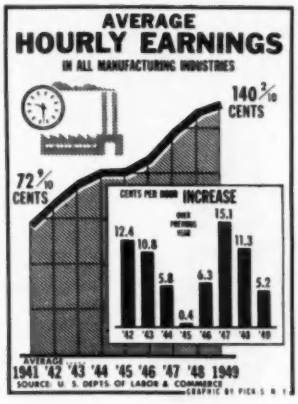
Dearborn Motors Corp., Detroit, Mich., has announced a new moldboard plow called the Dearborn Economy Plow. Engineered to operate with the Ford Tractor, it is lifted and lowered by the tractor's hydraulic touch control. The new implement features plow bottoms that are said to be usable in the majority of the hundreds of types of soils in the U. S., and Razor Blade shares low enough in cost so that they can be used and discarded.

Hiller Helicopter Has $400,000 Backlog

Hiller Helicopters, Palo Alto, Calif., reports a working production backlog of over $400,000 of civilian and military orders for the new Hiller 360 helicopter. Delivery is now on a 90-day basis, according to company officials.

Brantford Coach Buys Dominion Body

Dominion Truck and Equipment Co. Ltd., Kitchener, Ont., Canada, has been sold out to Brantford Coach and Body Ltd. The local plant will be closed, and the manufacturing and sales will be transferred to Brantford, Ont.



Polk Compiles Listing of Output Records

With new sales and production records in the automotive industries falling month by month, R. L. Polk & Co., Detroit, has compiled the following data covering previous records in various sales categories:

Best New-Car Sales Years (Based on Registrations)

(1)	1949	4,838,342
(2)	1929	3,880,206
(3)	1941	3,731,166
(4)	1948	3,490,952
(5)	1937	3,483,752

Total New-Cars Registered in U. S.
(As of July 1, 1949)
32,730,718 Cars

Total New-Trucks Registered in U. S.
(As of July 1, 1949)
7,087,633 trucks

Average Scrappage Rate (1925-1949)
Passenger cars—1,601,940 Trucks—258,980

Largest Total Car Registration, By States

(1)	California	3,230,022
(2)	New York	2,679,489
(3)	Pennsylvania	2,102,722
(4)	Ohio	2,046,502

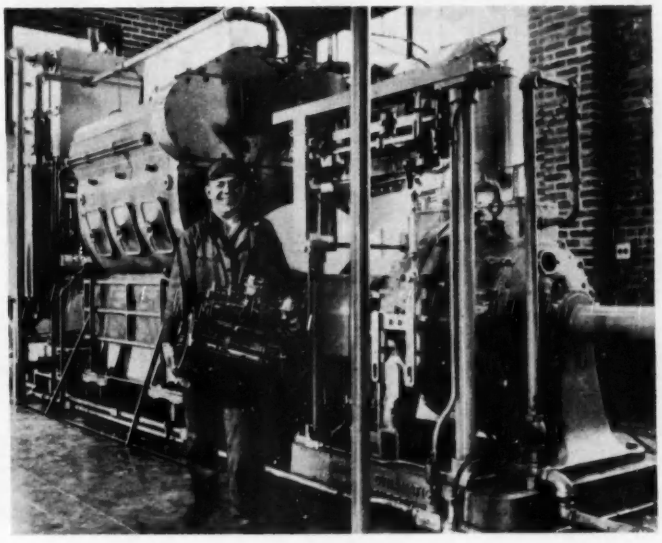
Largest Total Truck Registration, By States

(1)	California	534,493
(2)	Texas	456,198
(3)	New York	416,338
(4)	Pennsylvania	379,587

* Estimated.

Chicago Belting Forms Allis Seal as Subsidiary

The Chicago Belting Co., Chicago, has announced the formation of a new company, the Allis Seal Corp., as a wholly-owned subsidiary. Frederick E. Barth has been named as executive vice president of the firm.



TESTS THEM ALL

The Texas Co.'s laboratories at Beacon, N. Y., are equipped to test everything from miniature clock motors to gigantic Diesel engines for fuel and lubricant evaluation. The Engine Laboratory runs intensive stationary tests on everything from a huge 600-hp, 8-ton Electro-Motive Diesel to small automobile engines like the Crosley held by George Rice of the Texaco laboratory.

New World's Speedboat Record Set

A new world speedboat record of 160.3235 mph was recently set by Stanley S. Sayres in his Slo-Mo-Shun IV over Lake Washington at Seattle, Wash. The Slo-Mo-Shun IV is 28 ft long, and is powered by a 12-cyl, 1500-hp aircraft engine.

New Departure Sealed-for-life
Rear Wheel Ball Bearings

unsurpassed

for dependability and freedom from service

Built to be forgotten!

Proved by 16 years and billions of miles in actual service.

A New Departure creation—working unseen yet faithfully for driving pleasure.

Proof against neglect or wrong lubrication. No dirt can get in, no grease escape to cause slipping brakes. No bearing adjustment needed—ever! It is lubricated-for-life!

New Departure has produced over 159 million self-sealed ball bearings of various types.

This year millions of cars will roll easier—smoother—on New Departure sealed-for-life rear wheel ball bearings. Will yours?

A booklet of interest to automotive designers and owners alike will be sent on request.

Also makers of the famous New Departure coaster brake.

Nothing Rolls Like a Ball ...

NEW DEPARTURE

BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

103

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

Studebaker Corporation, Engineering Div.—**M. P. deBlumenthal** has been made Asst. Chief Research Engineer; **T. A. Scherger**, Powerplant Engineer; and **T. E. Wager**, Chief Electrical Engineer, and will continue to direct the electrical phases of automotive development.

Hudson Motor Car Co.—The appointment of **Paul E. West** as assistant to vice-president, has been announced.

Chrysler Corp. Export Div.—**K. H. Kingsley** has been appointed to the post of General Works Manager to fill the vacancy caused by the death of **L. H. Perry.**

Chrysler Corp.—The election of **Nicholas Kelley, Jr.**, as Secretary of the Corporation, succeeding **R. P. Fohey**, has been announced. Mr. Fohey is on an extended leave of absence due to his health.

North American Aviation, Inc.—**Alexander T. Burton** has assumed the newly-created post of assistant to the president.

Northrop Aircraft, Inc.—**Thomas H. Quayle** has been named Director of Associated Products.

Turbodyne Corp.—Announcement has been made that **A. J. Phelan** has been named President, General Manager and Chief Engineer.

Consolidated-Vultee Aircraft Corp.—**J. V. Naish** has been elected Vice-President, Contracts.

Boeing Airplane Co.—**John O. Yeasting** has been elected a Vice-President, heading the newly created Controller's Div.

Republic Aviation Corp.—**Richard G. Bowman** has been promoted to the newly created post of Asst. Chief Engineer.

Hyatt Bearings Div., General Motors Corp.—The appointment of **Raymond H. Cramer** as General Manager of the division, has been announced. Mr. Cramer succeeds the late **H. O. K. Meister.**

United States Steel Corp.—**Gilbert V. Blanquart** has been appointed Supervisor, Salary Administration Div. He succeeds **A. R. Mathieson**, recently elected President of the United States Steel and Carnegie Pension Fund.

General Electric Co.—**Harrison D. Beale** has been appointed Manager of the Renewal Parts Div., Industrial Div.

General Electric Co.—The appointment of **Floyd C. Pickett** as Asst. to the Works Manager, Fitchburg Works, has been announced.

Federal - Mogul Corp. — **H. Gray Muzzy**, formerly President, has been made Chairman of the Board; **Guy S. Peppiatt**, has been elected President.

Dearborn Motors Corp.—**Thomas A. Farrell** has been named President of the Corporation. He succeeds **Frank R. Pierce**, deceased. **Merritt D. Hill**, General Sales Mgr., has been appointed Vice-President and member of the Board of Directors; **G. D. Andrews**, Vice-President in charge of Sales; **Ralph E. Hunt**, Vice-President in charge of Engineering and Manufacturing; **I. R. Kappler**, Vice-President in charge of Purchasing and **James F. Pedder**, Vice-President in charge of Advertising.

Joseph T. Ryerson & Son, Inc.—**Allen P. Beckloff** has been appointed manager of the Tubular Products Div.

The Thermoid Co.—Two new members have been appointed to the home-office administrative staff. They are **William F. Penrose** and **Roland H. Loog.** Both men will be assistants to the Automotive Manager, **George S. Lamson.**

Bendix Aviation Corp.—**Capt. Howard T. Orville**, U. S. N. retired, has been named Director of Engineering for the Friez Instrument Div.

Illinois Tool Works—Announcement of the election of **John F. Miller** as Vice-President has been made.

The American Smelting & Refining Co.—**John L. Kimberly** has been named Sales Manager, Continuous-Cast Products, with headquarters at the Perth Amboy Plant. **Ralph W. Bailey** and **John V. Hackett** have been appointed Asst. Sales Manager. **Donald S. Goebel** has joined the company and will make his headquarters at the Whiting, Indiana Plant.

(*Turn to page* 112, *please*)

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

International Trade Fair, Chicago Aug. 7-19
SAE Nat'l West Coast Mtg., Los Angeles Aug. 14-16
American Chemical Society, Chicago Sept. 3-8
SAE Tractor Mtg., Milwaukee Sept. 11
Nat'l Assoc. Motor Bus Operators Annual Mtg., Chicago Sept. 13-15
Instrument Soc. of Amer. Conf. & Exhibit, Buffalo Sept. 18-22
British Truck Show, London Sept. 22-30
Assoc. of Advertisers Annual Mtg., Chicago Sept. 25-27
Nat'l Metal Trades Assoc., New York City Sept. 27-29
Paris Automotive Show, Paris Oct. 5-15
Industrial Pkging. & Materials Handling Expos., Phila. Oct. 10-12
SAE Nat'l Transportation Mtg., New York City Oct. 16-18
Nat'l Safety Congress, Chicago Oct. 16-20
Society of the Plastics Industry Nat'l Conference, Swampscott, Mass. Oct. 18-20
British Passenger Car Show, London, Oct. 18-28
Amer. Society for Metals' Annual Nat'l Metal Congress & Exhibition, Chicago Oct. 23-27
Amer. Welding Soc. Annual Mtg., Chicago Oct. 23-27
Nat'l Lub. Grease Inst., Chicago, Oct. 30-Nov. 1
Amer. Soc. Body Engrs. Technical Convention, Detroit Nov. 1-3
American Petroleum Institute Annual Mtg., Los Angeles Nov. 13-16
Power & Mech. Engineering Exposition, New York City Nov. 27-Dec. 2
Soc. of Plastic Engrs., New York City Jan. 18-20
Amer. Soc. Tool Engrs., New York City Mar. 17
Pacific Automotive Show, Seattle Mar. 21-24
International Auto Salon, Geneva March 8-18
Amer. Mgt. Assoc., Nat'l Packaging Expos., Atlantic City Apr. 17-20
Nat'l Air Races, Cleveland Airport May 19-20

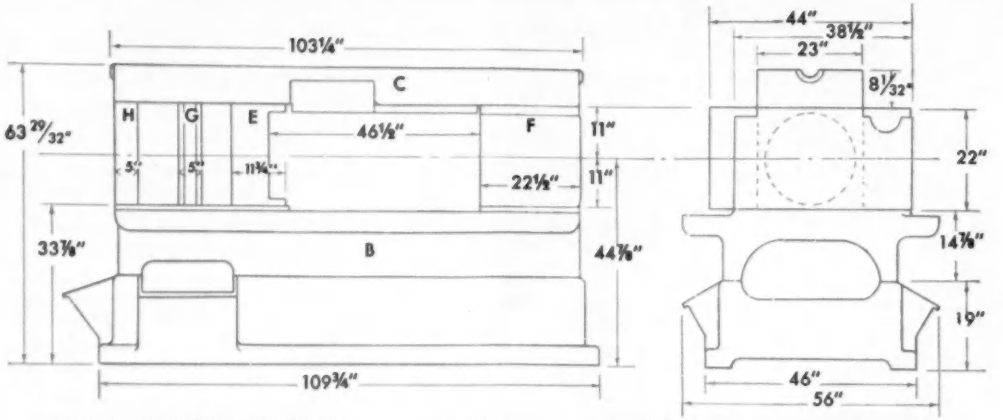
Necrology

Leon Arthur Michelat, 67, chief engineer, F.A.R. Tractor Co., Paris, France, former chief engineer Delage Automobile Co., designer of Delage cars which won first and third places at Indianapolis in 1914, died at Asnières, near Paris, on June 23.

Charles Lanier Lawrance, 67, pioneer aviation engineer and inventor of the aircooled Wright Whirlwind airplane engine, former president, Wright Aeronautical Corp., and vice president, Curtiss-Wright Corp., died on June 23 in East Islip, L. I., N. Y.

Gaston Marque, 42, director of public relations, Studebaker Corp., died June 26, in New York City.

Richard G. McElwee, 60, manager of the Iron Foundry Div., Vanadium Corp. of America, died June 21 at Niagara Falls, N. Y.



H, G, E — HEADSTOCK SUPPORTS Weight — 1233 lbs. | **B — BASE** Weight — 6655 lbs. | **C — TOP BED** Weight — 1232 lbs. | **F — GEAR BOX** Weight — 841 lbs.

BE VALUE WISE OR OTHERWISE

True of any "means goods," the purchase price of any Multiple Spindle Bar Automatic is only relative. It is "high" or "low" on the basis of the total cost of its total services, compared to other brands. Important items of total cost are those of operation and maintenance.

Machine analysis will invariably disclose the low cost operation and maintenance features that have been "built into" a machine. Such features are built into the CONOMATIC, beginning with its very foundation. The figures above substantiate the claims below.

THE 1½" Six Spindle MACHINE FRAME:

1. **Provides greater capacity for handling work.**

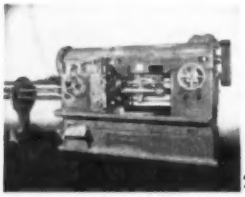
   The Frame provides a LONGER TOOLING AREA, with more positions and accommodations for tooling and attachment applications, with more clearance and conveniences for faster tool setting, than are provided by any other "automatic."

2. **Provides better support to work and tools.**

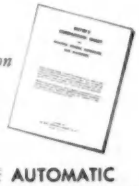
   The Frame provides better support and alignment to headstock members, tool slides, and other units and mechanisms, with BASE SUPPORT CLOSER TO THE WORK AXIS, with BETTER TOP BED SUPPORT TO SHORTER, "WEAVE PROOF," UPRIGHTS, and, with larger, heavier, and stronger, Top Bed and Base, than are provided by any other "automatic."

3. **Provides greater accessibility for lower cost operation and maintenance.**

   The Frame provides a more orderly arrangement of, and easier access to, all units, mechanisms, parts, and adjustments, than can possibly be provided by any "automatic" that does not have a VISIBLY ACCESSIBLE, NON-INTERFERING CAM SYSTEM.



Buyer's Comparison Chart will guide you to full information



A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

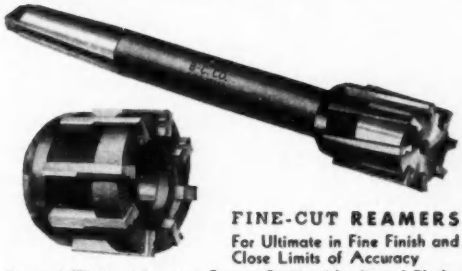
Specify BARBER-COLMAN PIN and WEDGE REAMER DESIGN

FOR BETTER SIZE AND FINISH CONTROL

HEAVY-CUT REAMERS

For Greater Stock Removal Roughing, Semi-Finish, Finishing

Pin and Wedge Mounting Equivalent to Solid Flute Construction
Also Right Hand Spiral Blades Available for Heavy Stock Removal
Increased Chip Clearance, Stronger Tooth Backing



FINE-CUT REAMERS

For Ultimate in Fine Finish and Close Limits of Accuracy

Pin and Wedge Mounting Permit Greater Number of Blades for Improved Finish
Blade Adjustment Gives Long Life with Minimum Maintenance Cost

SOLID FLUTED REAMERS

Chucking — Taper — Screw Machine — Jig Boring
Maximum Chip Clearance
Extremely Close Limits of Accuracy

25 YEARS ACCEPTED USE PROVES SUPERIOR JOB PERFORMANCE

- ★ IRREGULAR BLADE SPACING FOR IMPROVED FINISH
- ★ MORE BLADES PER REAMER DIAMETER
- ★ STURDY, NON-SHIFT BLADE MOUNTING
- ★ EASY ADJUSTMENT, QUICK SET-UP
- ★ LONGER SERVICE THROUGH IMPROVED SHARPENING
- ★ NO THREADS OR BEARINGS TO RECONDITION

All Styles in HSS, CAST ALLOY OR CARBIDE TIPPED

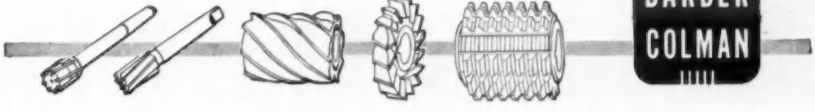
Twenty-five years of practical reaming experience cost nothing when you buy Barber-Colman Reamers. Yet this background provides the ultimate in production reaming design, fewer inspection rejects and lowest reaming cost. Check your reaming operations and consult with Barber-Colman Reaming Engineers. Their reaming experience will prove results with maximum job performance. A complete stock selection is available to meet your specific requirements.

***Send* FOR THESE DATA SHEETS**

Current Case Histories of Reaming Jobs Taken Directly From the Field. Get a Set Today. Ask For File 9628.

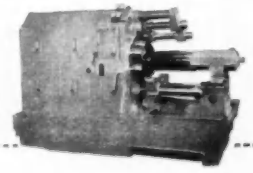
Barber-Colman Company

GENERAL OFFICES AND PLANT, 9629 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.

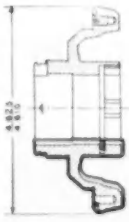


BARBER COLMAN

CUT-RATE, sub-standard marginal producers can expect distinguished company — namely the long established reputable manufacturer caught in the squeeze between competitive pricing and high costs. The margins are moving in — but there's room at the center of today's business picture for the manufacturer who takes advantage of the *new* standards of machine tool performance.



NEW BRITAIN
MODEL 675 AUTOMATIC CHUCKING MACHINE



Automotive transmission part, AISI C-1050 drop forged steel, finished in two operations on two New Britain Model 675 Carbide Tooled Chucking Machines. Sixty-five pieces are completed per hour with thirty-five operations performed by the two machines. They include forming, drilling, boring, turning, facing, grooving, trepanning, radius forming, chamfering, recessing and finish reaming. Unusual accuracy is required in maintaining one-thousandth tolerance on the diameters of the two bores and two-thousandths total indicator reading limits of concentricity. Typical of the ability of fully modern New Britains to make profits by making production fast, accurate and automatic.

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

550 H.D. 1

MULTIPLE SPINDLE AUTOMATIC SCREW AND CHUCKING MACHINES • SINGLE AND DOUBLE END PRECISION STRAIGHT AND CONTOUR BORING MACHINES • LUCAS PRECISION HORIZONTAL BORING, DRILLING AND MILLING MACHINES

How Long Will Tremendous for Cars and Trucks

By Leonard Westrate

Charles E. Wilson

President of General Motors:

"The automobile industry in the United States and Canada will turn out a record-breaking total of eight million passenger cars and trucks this year —seven million cars and one million trucks.

"The shortage of cars in General Motors is worse than it was a year ago or two years ago; also, in spite of the fact that we are producing at about a 30 or 35 per cent higher rate than we were last year, our dealers actually have fewer cars in their places of business than they had at this time last year."

Edgar F. Kaiser

President of Kaiser-Frazer:

"In my opinion, the current high demand for automobiles will continue for the balance of the year and well into 1951. Buying power in the middle income brackets has increased over 80 per cent since 1935-36. Since 1941 there has been an increase of over 32 per cent of wage earners in the $3000 to $5000 income bracket. The estimated some 10 million obsolete automobiles now on the roads constitute a new car backlog highest in automobile history.

"As for the future, I believe that the constantly increasing demand for such basic commodities as steel and aluminum is a strong assurance of continued general high industrial activity. This is a positive expression of the solid confidence that our businessmen and the general public have in our nation's future. Such confidence resulting in continued consumer demands and increasing production in all commodities is an assurance of consistently advancing prosperity."

TRYING to forecast business conditions for six months ahead is a difficult job at best, but it is particularly hard when optimism is bursting out everywhere. When things are humming and money is flowing freely there is a tendency for everything to take on a rosy tint including predictions of things to come.

So far as the automobile industry is concerned, sales and production never have been at such a high level as they are now. While it is true that there is a vague uneasiness in some quarters about maintaining current high levels, the general opinion in Detroit is that both production and sales are going to remain very high for the rest of this year. Already the industry has built more than 3 million passenger cars and is more than half a million ahead of this time last year and gaining steadily despite the fact that Chrysler divisions were down for 76 working days in late Winter and early Spring. Trucks also are ahead of last year, but only by a slight margin of about 5000. The interesting part of this situation, however, is that at the end of last year there were many predictions that total production of passenger cars and trucks this year would be off from 15 to 20 per cent from the 1949 level with some of the more optimistic forecasters seeing a possibility of equaling last year's performance. Now the picture has changed and industry leaders are confident that 1950 will be an alltime record year with 1951 close behind, barring an economic turndown which nobody expects. Production in the U. S. this year is expected to total about 6 million cars and 1 million trucks for a total of 7 million, compared with 6.2 million vehicles last year, or an increase of about 13 per cent.

Behind this ambitious program, of

Demand Continue?

course, lies a phenomenal selling record which runs back to the first of this year. Sales of passenger cars, particularly, followed an abnormal pattern when they started climbing rapidly in January and continued to increase month by month. Normally, January, February and the first part of March are very slow, but this year the pattern has been entirely different. Truck sales also have been climbing since the first of the year, and while they may level off later in the Summer, truck builders are confident that total truck sales this year will surpass those of 1949.

While all conditions appear to be favorable for achieving record goals during the rest of the year, there are a few clouds on the horizon. There are bound to be some letdowns in production over the next few months. The long Fourth of July and Labor Day holidays will cut production heavily and the usual slowdowns because of excessive heat in various parts of the country also will have an effect. There are some model changes in the works starting in August which also will affect production even though they will be of short duration. Toward the end of the year the big producers like General Motors and Ford, and possibly Chrysler, will change models so that production during the last two months will be affected somewhat.

One of the more critical situations to watch in the next few weeks is the progress of negotiations between labor unions and large automotive suppliers. It had been thought that the supplier companies would fall into line on pensions and other demands pretty much on the basis of the Ford and Chrysler settlements, but there is now evidence that the unions have upped their demands following the liberal settlement awarded by General

(*Turn to page* 122, *please*)

George Mason

President of the Automobile Manufacturers Association and President of Nash Motors:

"The automotive industry is almost certain to set a new all-time production mark in 1950. More than 3,700,000 new cars, trucks and buses were turned out in the first six months of 1950.

"In the six months ahead, only 424,000 units must be produced monthly to top the record 6,243,572 new vehicles built in 1949. That's a production rate of 31 per cent below the monthly average of the first six months of 1950, and more than 44 per cent below the rate attained during May and June.

"Sales executives throughout the industry are confident of their ability to sell what the factories can produce. The most serious production problem confronting the industry is the return of the steel shortage—particularly sheet steel, which is used in large quantities in the building of motor cars.

"Even with allowances for new model changeover, car production by Nash Motors during the second half of 1950 should be very close to the record rates of the first half of the year. First six months production was around 108,000—an all-time high for the company and about 40 per cent above the comparable period of 1949. Current estimates indicate Nash will exceed the 200,000 mark for the 1950 calendar year, against the 1949 total of 142,592. The tight steel situation makes it impossible to keep abreast of demand, and neither the steel picture nor the demand picture shows evidence of changing greatly during the last half of the year."

Walker A. Williams

General Sales Manager of Ford Motor Co.:

"I don't think there is much doubt in anyone's mind but that 1950 is going to be a record year as far as automobile production and sales are concerned. The current high demand does not give any indication of dropping off for some time and should continue well into 1951.

"We estimate that the industry will produce somewhere around seven million cars and trucks this year—six million cars and one million trucks. This compares with about 6,200,000 cars and trucks last year—an increase of approximately 13 per cent.

A Progressive Machinery

An Analysis of Old and Outdated Machines, Together with Engineering Cost Studies Leading to Recommenations for Replacement, Forms the Basis for Management Decisions in Modernization Program at Ford Motor Co. of Canada.

By Joseph Geschelin

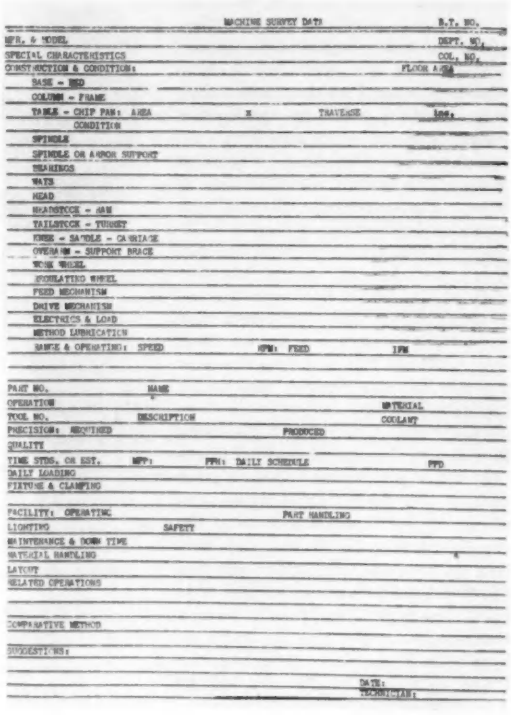
SINCE the end of the war there has been a realization that even in highly mechanized automotive plants there exist many over-age machine tools, some in poor mechanical condition and many of them profit stealers. It may surprise some managers to find that equipment which has been on the books as long as 20 to 30 years is still on the machine shop lines.

Why should we find such old equipment still trying to do a production job? One answer lies in the emphasis placed upon new equipment programs incident to new model introductions and product changes. Appropriations for such purposes are large and important and have the right of way. The fact of the matter is that while major changes are made in tooling a new cylinder block or crankshaft or a new transmission, the same incentive does not exist for making changes in setup for the gamut of parts and assemblies which have not required design changes. Consequently, such parts proceed on a work-horse basis from year to year and eventually add up to an impressive array of old and somewhat battered machinery.

How can industry meet this challenge? The writer was impressed with what is being done by the Ford Motor Co. of Canada. Within the year the management authorized a formal machinery replacement program designed to uncover old and obsolete machinery. An analysis of such equipment together with engineering cost studies leading to recommendations for its replacement ultimately forms the basis for management decisions in an orderly modernization program.

Now to the initiated it is obvious that age alone is no criterion of the usefulness of a machine. An appraisal of the economic worth of such equipment needs must include many other factors. On the other hand, one may be suspicious of the value of a machine that has been in operation for a long time, considering the major advances in design that have occurred in recent years. In addition to design obsolescence there is the problem of maintenance as well as the wastefulness of frequent down time. This is mentioned with a full realization that many old machine tools still perform acceptably, par-

Fig. 1—Machine Survey Data Form.


MACHINE SURVEY DATA

B.T. NO.

MFR. & MODEL

DEPT. NO.

SPECIAL CHARACTERISTICS

COL., NO.

CONSTRUCTION & CONDITION:

FLOOR AREA

BASE - BED

COLUMN - FRAME

TABLE - CHIP PAN: AREA X TRAVERSE Lbs.

CONDITION

SPINDLE

SPINDLE OR ARBOR SUPPORT

BEARINGS

WAYS

HEAD

HEADSTOCK - ARM

TAILSTOCK - TURRET

KNEE - SADDLE - CARRIAGE

OVERARM - SUPPORT BRACE

HAND WHEEL

ELEVATING WHEEL

FEED MECHANISM

DRIVE MECHANISM

ELECTRICS & LOAD

METHOD LUBRICATION

RANGE & OPERATING: SPEED RPM: FEED IPM

PART NO. NAME

OPERATION MATERIAL

TOOL NO. DESCRIPTION COOLANT

PRECISION: REQUIRED PRODUCED

QUALITY

TIME STDS. OR EST. MFT: PPH: DAILY SCHEDULE PPD

DAILY LOADING

FIXTURE & CLAMPING

FACILITY: OPERATING PART HANDLING

LIGHTING SAFETY

MAINTENANCE & DOWN TIME

MATERIAL HANDLING

LAYOUT

RELATED OPERATIONS

COMPARATIVE METHOD

SUGGESTIONS:

DATE:

TECHNICIAN:

Replacement Program

That the Ford replacement program is really working may be gained from this view showing old machines stored in a pit alongside the parking lot, ready for salvage and junking.

Fig. 2—(Below) Power Press Survey Data Form.

Fig. 3—(Right) Machine Survey Record Card. Reverse side gives data on proposed replacement machine, listing features and advantages, together with estimated savings.

POWER PRESS SURVEY DATA (MACHINE CLASS.)

MFR. MODEL NO. DEPT. NO. COL. NO. B.T.

TYPE FLOOR AREA FT. X FT.

PART: NAME NUMBER

MATERIAL SIZE GAUGE

OPERATION

AVERAGE PROD. HOURLY : DAILY QUALITY

AREA OF BED (F to B x R to L) in. x in.

SLIDE: FACE AREA in. x in. DEPTH OF THROAT in.

STROKE LENGTH in. SPEED STROKE/MIN CONT.

METHOD OF ADJ. CAPACITY tons

ELECTRICS RATING LOAD

METHOD LUBRICATION

TYPE AND CONDITION OF:

FRAME

FOUNDATION

DRIVE MECHANISM

DRIVESHAFT BEARINGS

CRANKSHAFT MAIN BEARINGS

CONN. ROD BEARINGS

GIBS

ELECTRIC WIRING & CONTROLS

DIE CUSHION

COUNTER BALANCING CYLINDERS

BRAKE

CLUTCH

MAINTENANCE DOWN TIME

LAYOUT AND MATERIAL HANDLING

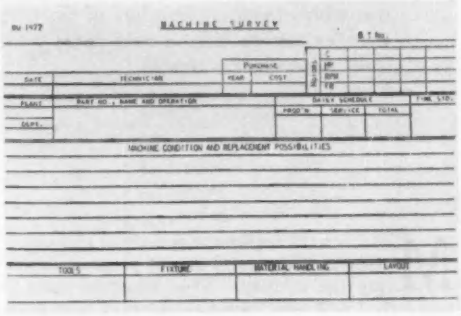
OPERATING FACILITY

LIGHTING

GENERAL SAFETY, GUARDS, etc.

RELATED OPERATIONS

COMPARATIVE METHOD



ticularly when they are used on short runs.

A recent study of what constitutes a sound equipment policy (see the MAPI Replacement Manual) suggests two principal requirements: (1) a reliable technique for determining when equipment is economically replacable; and (2) an organizational setup to insure that management, including top management, is apprised promptly and fully regarding potential re-equipment opportunities.

Such advanced thinking places greater emphasis upon the fact that a large manufacturer has embarked on a formal replacement program. Wisely Ford has assigned a team of ten process engineers, headed by a supervisor, working in the production engineering department but divorced from other activities. Each man is assigned to a specific type of production equipment such as lathes, milling machines, grinders, drill presses, punch presses, and the like.

(*Turn to page* 86, *please*)

Rise of the

by
R. Raymond
Kay

RECENTLY, as guest of the Mexican government, the author visited Mexico to cover the border-to-border race—one of the largest and longest stock car races ever held. While in Mexico his interest was quickened by the country on the march and he felt we would be doing a service to the automotive industries of both the United States and Mexico by making a first-hand report on the condition, size and scope, and impact on the Mexican economy of its automotive and allied industries.

He met and interviewed President Miguel Alemán; Augstín García López, Secretary of Communications and Public Works; Governor Eduardo Vasconcelos, of Oaxaca; Jose Rivera R., Director General, Mexican Road Association; and Industrialist Antonio Ruiz Galindo. Top men in the automotive assembly plants and leaders of the industry were extremely helpful with facts and figures. Here is the report.

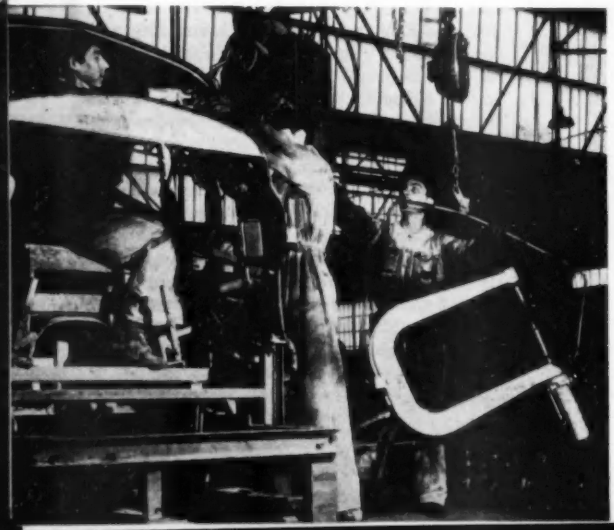
Perhaps this is a good time for the United States automobile industry to re-examine and re-appraise the industrial progress of the new, dynamic Mexican economy. What actually do we see going on there? Does the current activity give us a peep into the future?

The country is charged with a determination to lift itself by its economic bootstraps and to follow the pattern of its neighbor to the North. The U. S. automobile industry is contributing to Mexico's rapidly expanding economic and social life. This contribution is more than the mere supplying of U. S. made automobiles, buses, trucks and tractors in exchange for Mexican raw materials. It is the actual linking together of facilities of two nations in a large and complex enterprise.

MAÑANA is no longer the industrial philosophy of Mexico. A new rhythm of progress is sweeping the country. New industries have been established and existing ones enlarged and modernized. New factories, new roads, new dams, new railroad equipment, and new office buildings are in evidence wherever one turns.

The economically active population of the country has increased considerably. Unemployment is practically non-existent. Industry continues to employ more and more workers and the number of technically trained workers is increasing constantly. Wages have reached a new high level. In some industries, production in the last two years was five times greater than in the years preceding 1948.

Mexico's middle class is small in numbers and quite limited in purchasing power. There are, of course, the rich and vast numbers of poor. The Alemán administration is striving desperately hard and succeeding little by little to establish a large and substantial middle class. For it will be the middle class, in the main, who will be



These Mexican workers are assembling a body in the Chrysler plant.

Mexican Automobile Industry

financially able to use the thousands of miles of new first class highways now under construction, and it will be the middle class who will purchase the bulk of the automobiles that are assembled in Mexico.

Let's take a look at the size and scope of the Mexican automobile assembly industry today. Beginning in 1926 with an investment of $34,680, the industry's total investment is now $29,362,400. Of that total, General Motors' share is $13,409,600 and Ford's $11,328,800. Excepting GM and Ford, which are 100 per cent U. S. owned, the rest of the plants are owned by Mexican capital. They include Chrysler, Nash, Hudson, Packard, International Harvester, Diamond T, and Reo. The Nash operation also assembles Studebaker and the Willys Jeep, and Hudson assembles Renaults.

The roofed area of the industry in 1936 was 32,100 sq ft. Today it has a roofed area of 1,310,236 sq ft and a total area of 4,379,135 sq ft. Few industries in Mexico have registered similar growth. It confirms the intent of management to reinvest a large part of its profits in the country. It also indicates the confidence the investors have in the industrial future of Mexico.

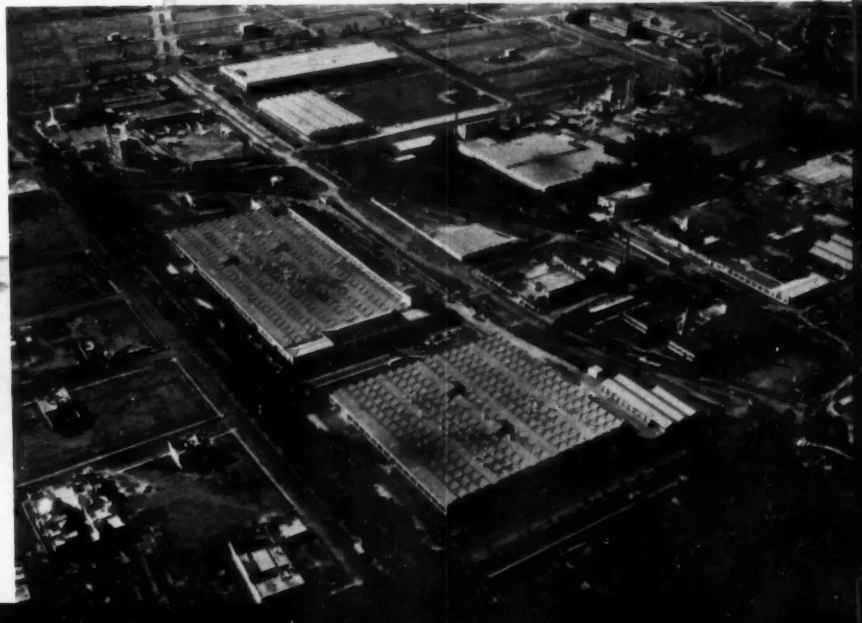
Total production of the assembly plants in 1947 was 21,000 units. Today, the actual potential is 51,150 units per year. But the industry is operating at only 32 per cent of capacity.

To conserve the dollar reserves of the country, the government has established a fixed annual production quota for each plant. Importation of assembled cars is prohibited in order to enable the government to

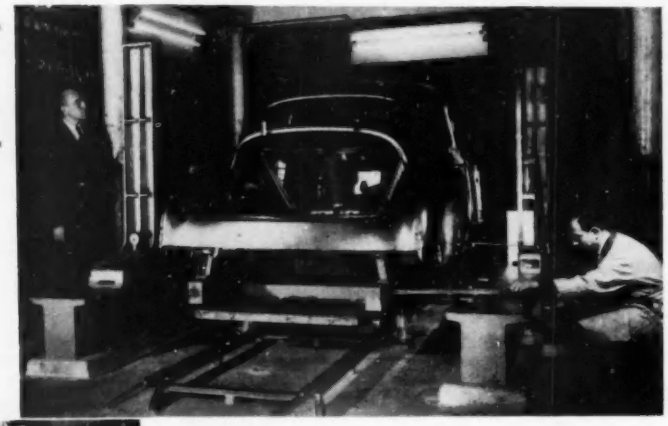
"PLEASE convey to AUTOMOTIVE INDUSTRIES' readers that the Mexican government welcomes, encourages and stimulates the development of industry. The automobile is vital to all the activities of modern life. Our huge highway construction program is bound to create an ever increasing demand for all forms of motor transportation. The automotive industries have a magnificent opportunity in Mexico."

Agustin García López
Secretary of Communications and Public Works.

Four buildings shown here — two top center and two lower center — house General Motors' Mexican facilities.

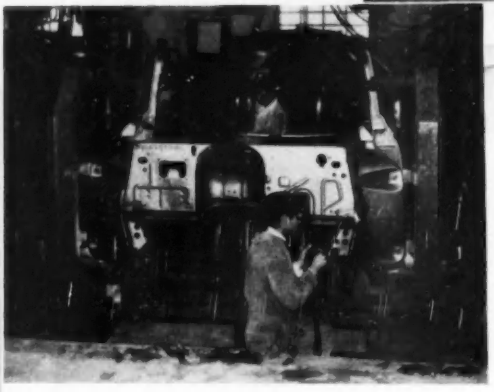


Mexican Automobile Industry



View of the body checking station at one of GM's factories. This is said to be the only setup of its kind in Mexico.

Modern equipment is used in the body assembly department at Packard.



control outgoing dollars and to stimulate the growth of domestic industries. The June 1949-1950 quota* of 16,375 units was allocated as follows:

General Motors	5,000
Ford	5,000
Chrysler	3,250
Nash	600
Studebaker	300
Willys Jeep	200
Packard	525
Hudson	400
Renault	200
International Harvester	600
Reo	125
Diamond T	100
Miscellaneous	balance

*—These quotas run about 60% passenger cars, 40% trucks and buses.

The government stipulates that 50 per cent of the cars produced by GM, Ford, and Chrysler must be in their lowest price line; Chevrolet, Ford, and Plymouth. Leaders in the industry predict that a small increase in the 1950-51 quota might be granted. The best estimate is about 1000 extra units, all of which will be allocated to European brands and all to be assembled by Mexican plants as follows:

Chrysler will assemble British Austin
Packard will assemble British Hillman
Hudson will assemble French Renault
Ford will assemble British Ford
GM will assemble German Opel and British Vauxhall
No announcement has yet been made as to who will assemble the Czech Skoda.

(*Turn to page* 90, *please*)

Lowering V-8 engine into chassis at Ford plant.

Economics of Lower Alloy Steels for High Quality Gears

By V. E. Hense, H. H. Miller, and R. B. Schenck

Buick Motor Div., General Motors Corp.

At Buick the trend in selection of steels for automotive gear applications has been toward the types containing less alloy. A great deal of testing is necessary in the application of new steels to secure adequate cost figures for comparison, but generally the decrease in cost of the lower alloy steel is great enough to absorb slight increases in processing cost. In the application of new steels, it is usually possible to obtain the required end quality, but difficulty is encountered to a greater or lesser extent in fitting the material into existing equipment, in securing the required machinability, or in controlling heat treat distortion.

The extent to which forging grain flow and annealed structure influence distortion during the heat treatment is not too well understood, but in general it is considered good practice to keep the forging grain flow as uniform as possible and concentric with the axis of the part. In the same way, distortion caused by stresses set up during machining operations cannot be evaluated easily. Stressing during the machining operations can be lessened by the use of a free cutting structure. Ideally, gears should be free from stress prior to the hardening operation. The importance of furnishing parts with uniform distortion to subsequent operations cannot be minimized. Herein lies one of the greatest factors in maintaining a high quality level.

Improvements in heat treating practice have involved the introduction of continuous gas carburizing furnaces which have improved quality, uniformity, and reduced labor costs. Flame hardening, induction hardening, and hot quenching are comparatively new methods of heat treating, and these methods are used when design and accuracy will not permit economical furnace hardening. It is evident that much progress can be made in the application of heat treatments for lowering processing costs and in improving quality.

Dynaflow Transmission Gears

At the start of Dynaflow production, the low range reaction gear was made of SAE 1050 steel, oil quenched, and tempered to 229 to 269 BHN before machining. The gear was induction hardened to 0.050 in. below the root of the teeth and tempered at 350 F.

In induction hardening, quenching was done on the inside of the gear hole so that no water was played upon the teeth. This practice was used until low hardenability heats, which would not harden satisfactorily, were encountered. Therefore, an arrangement was made by which the quench water was allowed to quench directly on the gear teeth, but difficulty with quenching cracks caused a change to oil quenching and to SAE 1052 steel to provide sufficient hardenability.

Originally the Dynaflow planet pinion gears were made of SAE 4620, carbonitrided in a continuous furnace to a case depth of 0.008 to 0.012 in., oil quenched, and tempered at 450 F. However, an improvement was obtained in distortion characteristics by carbonitriding in a batch type furnace and quenching in oil at 300 F.

This practice produced a very satisfactory gear, but there was a film of oxidized oil which could not be removed except by brushing. In order to eliminate this condition, the gears were carbonitrided in a rotary furnace, quenched in salt at 400 F, and tempered at 450 F.

Later the material specification was changed to SAE 1330; quality was not affected and material cost was decreased. This necessitated an increase in the salt quenching temperature to 500 F.

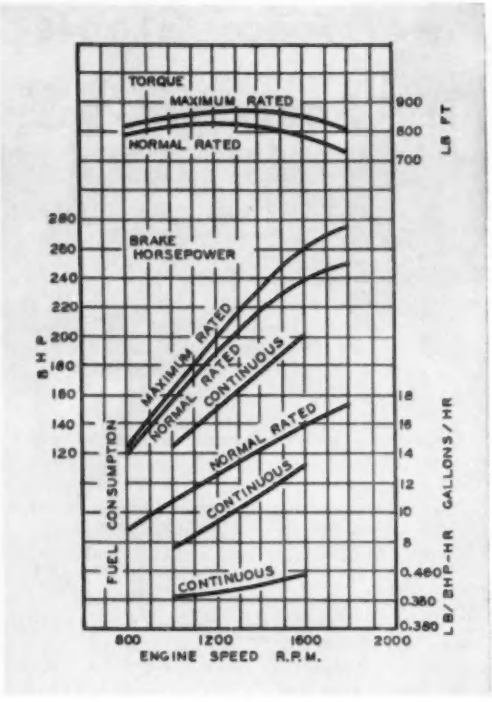
Conventional Transmission Gears

At the present time SAE 1340H is being used as the steel specification for Buick transmission gears. Gear forgings are cycle annealed to a hardness of

(*Turn to page 78, please*)

Engineering Details of the

GM 110



Performance ratings of 6-110 basic engine. Power ratings are based upon an air density corresponding to the standard barometer of 28.25 in. hg. at 1500 ft altitude and an air temperature of 90 F.

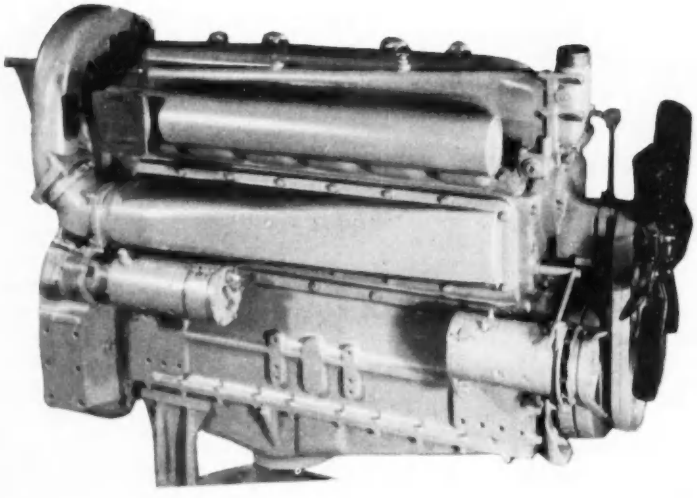
AFTER a long lapse since the original version of the Detroit Diesel "110" engine was exhibited in Chicago, the Detroit Diesel Div., General Motors Corp., has formally released details of the production model. Despite earlier speculation, this engine is of cast iron construction, same as the familiar "71" Series, and is fitted with liners of dry type.

It is being groomed specifically for large earth-moving vehicles, for railcars, marine and general industrial and oil field applications. Apparently there is no plan at present to supply this engine for conventional motor trucks or buses.

First application of this engine has been made in the "RDC" Budd railcar where its compact design permits two powerplants with hydraulic drive to be mounted under the car floor.

One of the major design features of the engine is a new and more efficient gear-driven centrifugal blower supplying considerably more air than is needed for combustion. It is mounted at the rear, above the flywheel, this location offering the best connection to the main gear train and contributing to compactness as well. The blower impeller is an aluminum alloy forging nine in. in diameter, of open type with radial vanes. A spiral air inlet helps maintain high efficiency.

GM injectors, one for each cylinder, pump, meter and atomize the fuel, and are easily removable for inspection or replacement.



Fan to flywheel version of the 6-110 Diesel. Additional optional equipment such as the GM torque converter can be supplied with the engine.

Diesel Engine

Cylinder block and head are one-piece castings, both being symmetrical about a vertical plane between the No. 3 and 4 cylinders. This symmetry allows the cylinder head and block to be reversed, giving a choice of rotational directions and making possible a variety of accessory locations to suit installation requirements.

The engine is of rugged, heavy-duty construction throughout. All wearing parts such as cylinder liners, bearings, valve guides and inserts are precision parts and are readily replaceable, which adds to engine life and to ease of repair. As an example of the heavy-duty design employed, the seven main bearing crankshaft journals are of four-in. diameter; the connecting rod journals three and one-half in. Use of a 1-5-3-4-2-6 firing order, together with two-stroke operation, assures a smooth running, well-balanced engine.

The customary forced feed lubrication is provided, with a gear-driven pump delivering 45 gpm at 1800 rpm. The oil gallery is a separate tube cast in the cylinder block, eliminating long hole drilling operations. Oil pans have removable bottom cleanout covers.

The "110" is offered as a bare engine; with full equipment for marine or industrial use; or with special accessory arrangements for a variety of end products. Optical accessories, which may be powered directly from the gear train, include a hydraulic steering pump, an air compressor, and a pump to circulate oil through a General Motors torque converter. The torque converter is designed specifically for the engine and installed as an integral unit at the factory for those applications where a drive of this type is advantageous. The General Motors hydraulic reverse and reduction gear also is available for marine applications.

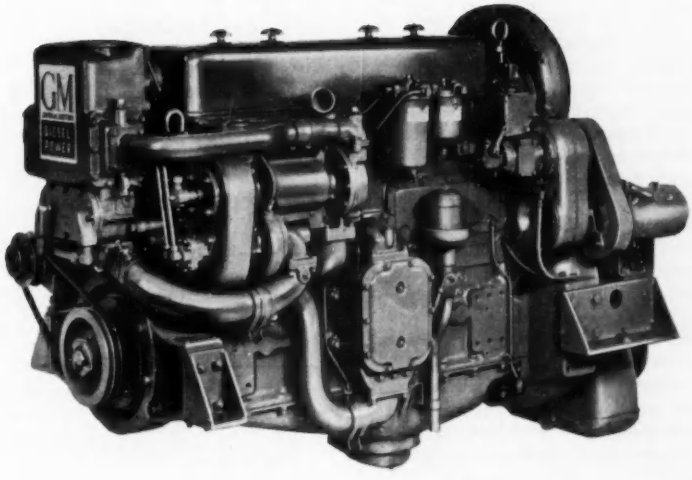
Industrial and marine sales and service of the new "110" engine will be handled in the United States by

(*Turn to page* 120, *please*)

Condensed Specifications
Basic "110" Engine
Two-Cycle, Valve-in-Head Type

No. cylinders	6
Bore	5 in.
Stroke	5.6 in.
Displacement	660 cu in.
Compression ratio	18 to 1
Rated bhp basic engine (max.)	275 @ 1800 rpm
Rated bhp with standard equipment (max.)	254 @ 1800 rpm
Normal rated bhp with standard equipment	229 @ 1800 rpm
Bmep, continuous rating	70 @ 1600 rpm
Maximum torque	834 lb ft @ 1200 rpm
Engine lube oil capacity	36 qt*
Net weight dry	2560 lb*
Cooling water cap.	7.5 gal*

* Fan to flywheel installation.



The 6-110 marine Diesel is available with a variety of accessory locations and in a choice of rotational directions.

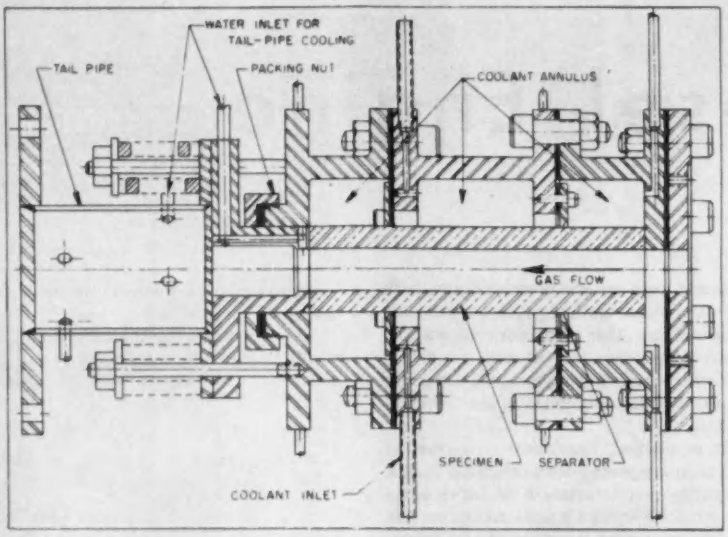


Fig. 1. This sectional view of the apparatus used for sweat-cooling tests shows the location of coolant annulus, coolant inlets, and the porous cylinder.

Sweat Cooling

Sponsored by the U. S. Army Ordnance Dept., the California Institute of Technology made a Study of Cooling by Injection of a Fluid Through Porous Walls. Some of the Important Test Results and Conclusions Are Presented Herewith.

By H. L. Wheeler, Jr. and Pol Duwez,
Jet Propulsion Laboratory,
California Institute of Technology

HIGH temperatures encountered in the operation of jet engines have imposed drastic requirements upon materials used in their construction. To meet these requirements, research is directed toward finding materials capable of being efficiently cooled.

Besides the conventional method of cooling by means of a liquid in contact with a material exposed to a high rate of heat transfer, a less orthodox method consists in making the part to be cooled of a porous material and forcing a cooling fluid through the pores. In this scheme, known as sweat cooling, the temperature of the coolant, which moves in a direction opposite to that of the heat flow, increases gradually while passing through the porous material. On emerging from the wall, the coolant forms a protective layer which materially alters the heat transfer from the hot gas stream to the wall. Existence of this protective layer which tends to reduce heat transfer to the wall, and the very efficient exchange of heat between the porous wall and the coolant result in a wall temperature

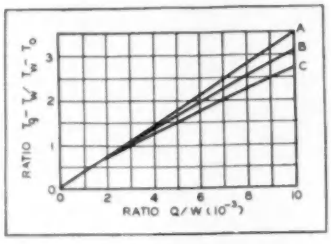


Fig. 2. Theoretical and experimental curves for different wall materials. The theoretical curve is shown at (A). The other two curves are results of experiments — (B) nickel-molybdenum-iron alloy, and (C) copper.

(*Turn to page* 110, *please*)

WILL the Low Priced Car Be Turbine Powered ?

By Henry C. Hill
Boeing Airplane Co.

THE gas turbine may well be the means for achieving the return of the low priced automobile. This conclusion is suggested by recent studies of the small gas turbine with reference to its ability to compete with reciprocating engines.

While it is still too early in the development history of the gas turbine to be positive on broad generalizations, the many unknowns are being clarified one by one as running experience is being accumulated. There is an abundance of good theoretical data available with substantiation from components tests of turbines, compressors and burners, for large engines. Most of these studies when applied to small engines for automotive use leave the careful investigator unsatisfied that there is a compelling reason why gas turbines should replace piston engines in automobiles. The reason for this is that the inherent defects of the piston engine as compared to the gas turbine have largely been overcome by long development, engineering ingenuity and production skill. Why then spend large amounts of money developing a turbine engine substitute, especially when the turbine would appear to have a substantial fuel consumption handicap?

In the first place, let us remind automotive engineers that a similar situation existed four years ago in the aircraft engine industry. After 20 years of forced draft development effort the aircraft piston engine had arrived as a dependable high performance machine. It seemed fantastic to believe that the gas turbine, much less the jet gas turbine could replace these highly developed reciprocating engines in the foreseeable future. Today the

(*Turn to page* 67, *please*)

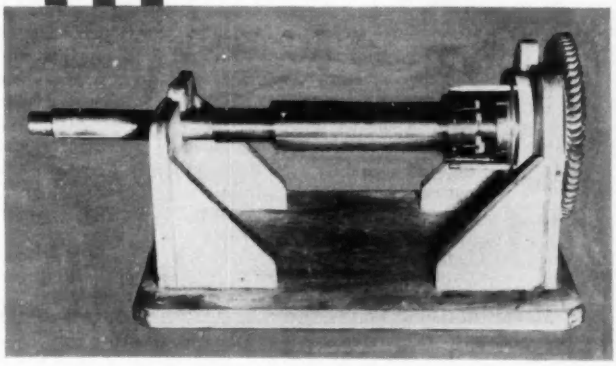
Possible Weight Savings for a Turbine Powered Car

	Total Car Weight (lb)	5 Pass. & Baggage (lb)	Gross Weight (lb)	Engine Transmission & Cooling System (lb)	Car Without Engine (lb)
Present popular make cars	3100	900	4000	750	2350
Proposed gas turbine car	1800	900	2700	180	1620
Weight reduction	1300	0	1300	570	730
Percent reduction	42%	0%	32.5%	76%	31%

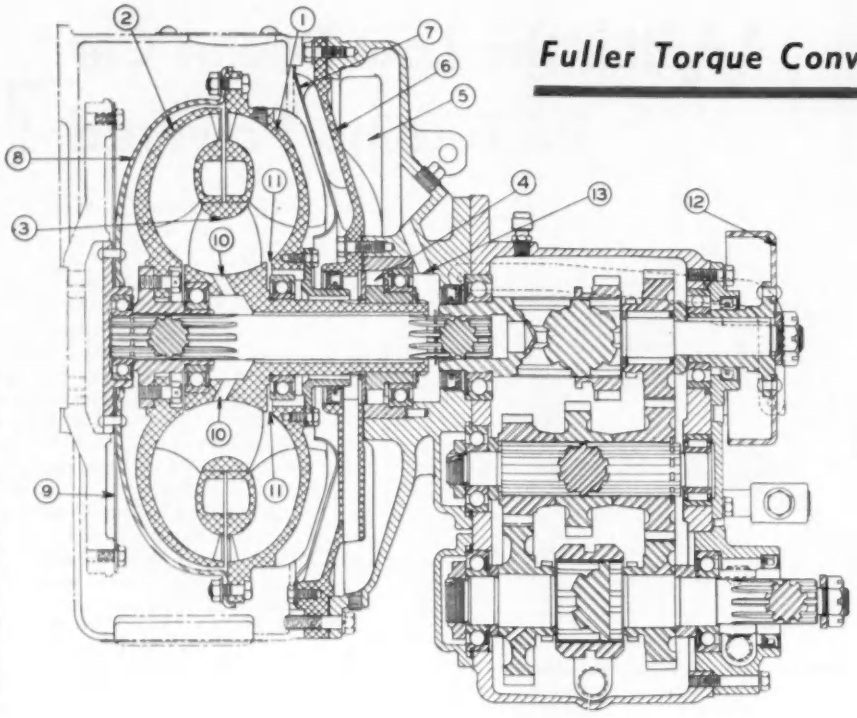
Note that because the engine and transmission weight of the lightweight turbine powered car are reduced by 76 percent, the car weight reduction of 42 percent is obtained with only 31 percent reduction in chassis and body weight.

It should also be observed that installation of the conventional engine in the light weight car (were this possible) would not give anything like the same order of performance because gross weight would be only 13.2 percent less, instead of 32½ percent less.

Rotor assembly for small turbine engine is shown below

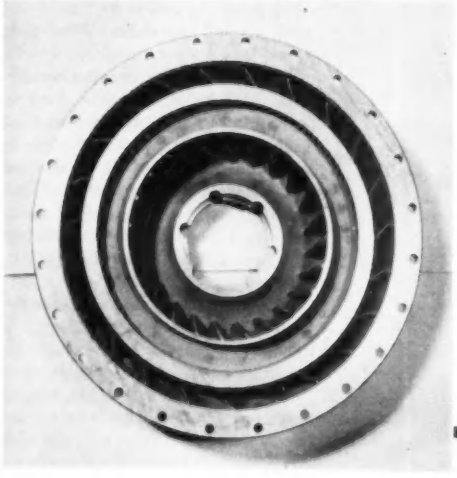


Fuller Torque Converter has



Longitudinal drawing of the torque converter.

The pump element, an aluminum sand casting, has integral vanes on the outer (back) surface for air cooling. This view of a production casting illustrates the excellence of surface finish.



CROWNING many years of research and road testing is the announcement by International Harvester Co. and the Fuller Mfg. Co., Kalamazoo, Mich., of a unique converter-coupling drive. The arrangement illustrated in cross-section represents an application of the Fuller converter-coupling in combination with a special two-speed transmission with offset drive shaft for the International Model LB-14D, one of the Company's door-to-door delivery models.

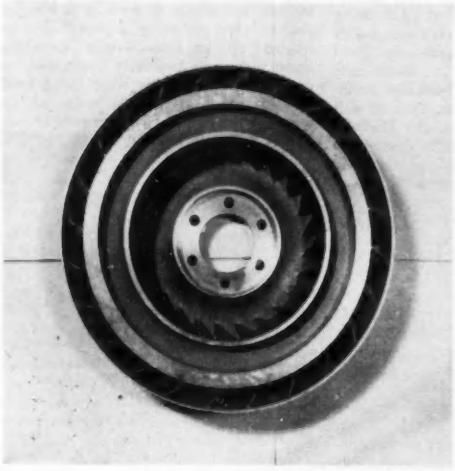
The Fuller converter-coupling, as illustrated, is of three-element type with a single stator runner mounted in the center as shown. According to the Company the converter-coupling embodies a number of unique features of interest to our readers. These may be outlined briefly as follows:

1—It is a self-contained package with an enclosed housing including a built-in, air-type oil cooler without outside plumbing connections.

2—The unit has been simplified to the fullest extent

Unique Air Cooling Arrangement

By Joseph Geschelin



This is a production casting of the aluminum turbine runner.

in the interest of minimum cost and ease of maintenance and is notable for the absence of a pump for the hydraulic pressure system.

3—In the interest of minimum cost, the pump and turbine runners are aluminum sand castings made by a unique technique with a one-piece core for the vane system of both elements.

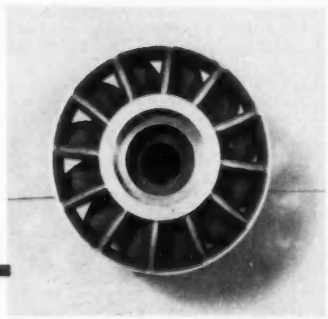
4—Another item of interest is that all three rotating elements are balanced individually to extremely close tolerance so as to assure perfect balance at all speeds.

Referring to Fig. 1, the pump element (1) is an aluminum sand casting with integral vanes on the outer surface to serve as a centrifugal fan. The turbine runner (2) at the left is assembled to the splined output shaft through a flange as shown.

The stator runner (3) mounted symmetrically between the pump and turbine runners is cast integrally with a long extension

(*Turn to page 76, please*)

Rear quarter view of the converter-coupling drive assembled to an International Harvester engine.



The single stator runner is shown here.

AIRBRIEFS

By ROBERT McLARREN

Taking Stock

For obvious reasons the Air Force has run an inventory on its "ready to fight" combat units and the story is a grim one. There are 19 fighter groups, of which 17 are day fighter units and only two are all-weather groups. Of this total, only 14 groups are equipped with jet aircraft: three F-86 *Sabre*, five F-84 *Thunderjet* and six F-80 *Shooting Star*. Jet fighters are, of caurse, the only front-line types to be counted on and this means that we have about 1000 jet fighters of combat performance ready for action. Both of the all-weather groups are equipped with the piston-engined North American F-82 *Twin Mustang*, although one of the units is currently receiving first deliveries on the Lockheed F-94 Jet all-weather fighter. In the strategic bombardment arsenal, there are three Convair B-36 groups in service and a fourth is receiving its airplanes, or a total of about 100 of the huge weapons ready for action. Supporting these famed giants are three Boeing B-50 and eight Boeing B-29 medium bomber groups, a total of about 250 *Superfortress* types or about 350 combat-effective bombers. Thus, the U. S. Air Force can offer only about 1350 combat aircraft of first-line class in an emergency. Supporting these are about 3500 other combat aircraft of second-line capabilities. Non-tactical types bring the total up to about 8000 operational aircraft of all types. About an equal number are in storage, or a grand total of roughly 16,000 aircraft of all types owned by the U. S. Air Force. But the USAF knows well that only the 1000 jet fighters and 350 bombers could be ordered into combat in a sudden emergency.

Lockheed Expands

After five years of the aircraft manufacturing industry rattling around in huge war-surplus facilities, the news that Lockheed Aircraft Corp. is building a multi-million dollar addition to its facilities at Burbank, Calif., is indicative of the fact that this condition has now run its course. The new Lockheed facility is designed to handle new production problems, rather than a mere expansion of capacity. Key item in the new program is an 8000-ton capacity Birdsboro hydraulic press to handle the forming of aluminum alloy sheet up to six in. thick, 10 ft wide and 30 ft long! This giant press, which weighs 1750 tons, will be installed first in a foundation 12 ft deep, and the new building erected around it. The press, built by Birdsboro Steel Foundry and Machine Co., Birdsboro, Pa., cost $750,000. The $466,000 building will contain 33,000 sq ft and will also house a 200-ton capacity Hufford stretch press ($318,000), a horizontal Hydrotel automatic milling machine ($138,000), a 20-ton capacity Ceco pneumatic stamping hammer ($103,000), a boiler ($178,000), automotive and materials handling equipment ($133,000) and $231,000 worth of portable and standard tools. This heavy-duty, expensive equipment typifies the type of expansion demanded of the industry by new aircraft forms, which require large, heavy-gage sheet as well as the volume production of heavy-duty spars and fittings from 75ST aluminum alloy and, in the not-too-distant future, steel alloys. Wings of fighter planes designed for supersonic performance will be virtually solid to support the very large bending and torsion loads required in very thin sections.

The Impossible Achieved

In these days of 10,000 hp turboprop aircraft engines, mention of the old-fashioned piston engine may lack lustre. But a goal reached is an achievement, despite the fact that the goal itself may no longer be significant. Pratt & Whitney have obtained a full 4000 hp from their famed R-4360 Wasp Major engine as an approved rating and an astonishing 4360 hp under test conditions. Although the magic figure of one hp per cu in. displacement has been achieved before, it has never been accomplished in an engine of this size, which was long held to lie on that part of the displacement-specific output curve which was leveling off. P&W have put the lie to this concept and recorded a significant achievement in power plant development. At these extreme power conditions, the engine exhibits a specific weight of only a little more than 0.8 lb per hp, a simultaneous achievement. Yet this is not the end, for P&W expect the power to go as high as 5000 horsepower when counled with its variable discharge turbine arrangement.

Dynamic Tests Prove Strength

Provided the safety factor is permitted to dwindle to zero, it is now apparent that existing aircraft can be loaded up to unbelievable tonnages. Such tests are normally conducted under static conditions with dead loads as primarily structural tests of the aircraft. The Air Force recently conducted dynamic load tests on the Boeing B-50 and C-97A aircraft to obtain not only strength data but performance information as well. A C-97A was loaded up to 174,500 lb (about an 18 per cent overload) and flight tests conducted successfully at Edwards Air Force Base, Calif. At this gross weight, the airplane has a wing loading of about 100 lb per sq ft, the same as the Bell X-1 research airplane! Despite this remarkably high loading, however, the *Stratofreighter* and its B-50 military counterpart loaded to 173,000 lb made repeated takeoffs and climbs to the satisfaction of Air Force and Boeing engineers conducting the tests. As a measure of comfort to the public flying on commercial *Stratocruiser* transports, the maximum allowable gross weight of the airplane at this time is a mere 141,500 lb.

Supersonics Noisy?

The ubiquitous flying saucer, on which we have carefully avoided comment in these pages—and will continue to do so, has now been joined by another aircraft phenomenon, the "thundering" fighter. For many, many months residents in the area adjacent to Wright Field have complained of violent claps of thunder, not infrequently reported as aircraft explosions, during the time that high-speed jet fighters were in the air. Similar thunderclaps have been heard by reliable witnesses at Air Force jet fighter bases and near NACA Ames and Langley laboratories. Suspecting sonic speed aircraft as the culprits, the Air Force recently conducted tests at Wright Field by placing a North American F-86A *Sabre* jet fighter in a dive at 40-50,000 ft following which sonic speed was quickly obtained. The fighter was pulled out of the dive at about 25,000 ft and seconds later a loud thunderclap was heard on the ground. Air Force has advanced,

(*Turn to page* 116, *please*)

Unusual Boring Machine Setups for Ultramatic Parts

FINE surface finish and maintenance of close tolerances are matters of importance in Packard's Ultramatic Division. It is, therefore, of interest to find a number of unusual operations tooled on the versatile New Britain precision boring machines which lend themselves especially for these applications.

Two of the operations are illustrated here to exemplify the versatility of this equipment. Fig. 1 is a close-up of the work station of a two-spindle New Britain tooled for boring and facing planetary pinions. In this case the machine is finishing long pinions in two stages — semi-finish-bore and finish-face one end, at the right; and finish-bore, and finish-face the other end at the left. The vertical slide is tooled for facing operations. A similar machine does the same operations on short pinions.

Tolerances on this operation are quite exceptional. Precision-boring is held to plus or minus 0.0003 in.; while the length of the bore is held to 0.002 in.

One of the most unusual operations to be performed on a precision boring machine is the generation of a ball race on the face of the planetary sun gear as shown in Fig. 2. This is done in the green, holding surface finish around 10 to 12 microinches. The work is then heat treated to harden the face and race. The only operation required after

(*Turn to page* 88, *please*)

Fig. 1. Work station of New Britain two-spindle boring machine tooled for boring and facing planetary pinions.

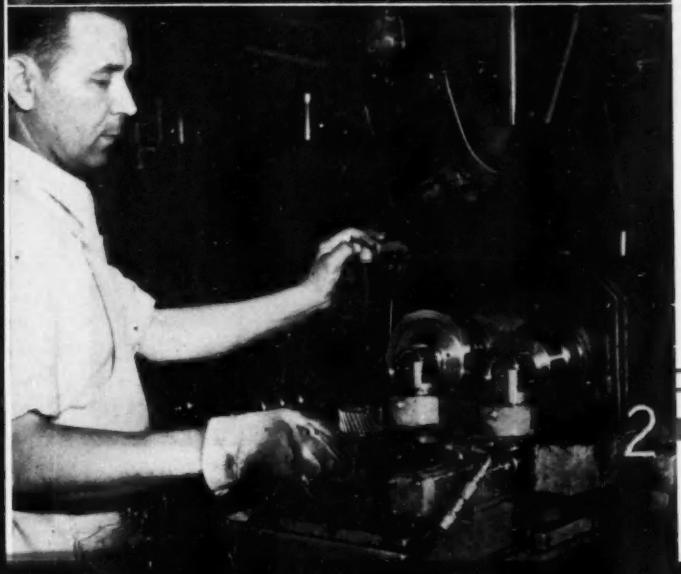
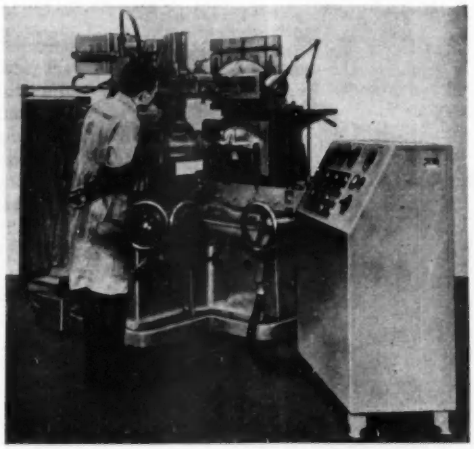


Fig. 2. Generating ball race on face of planetary sun gear in precision boring machine.

NEW EQUIPMENT • PRODUCTION •

FOR ADDITIONAL INFORMATION regarding any of these



Keller BL tracer-controlled milling machine, put out by Pratt & Whitney

M-12—Tracer-Controlled Milling Machine

The new Keller BL milling machine put out by Pratt & Whitney, Division of Niles-Bement-Pond Co., Hartford, Conn., embodies a new conception of automatic electric tracer control. In producing dies, molds, experimental parts and irregular shaped pieces this control enables the tracer to glide smoothly over any contour 2 to 3 times faster on finishing operations. The new design of automatic tracer included in the control operates in conjunction with an automatic variable speed control to provide contour variation of the individual machine motions called for by the tracer—in proportion to the slope being followed.

New drive units for the vertical, horizontal, and transverse movements of the machine, with an increased range of travel speeds and step feeds, replace the old style drives with their four gear shifts. The new units have a single shift and magnetic clutches driven by individual variable speed motors. The magnetic clutches engage or disengage instantaneously under command of either push-button control or the tracer. The new travel speeds are infinitely variable from 0.5 in. to 30 in. per minute and are completely controlled from the operator position through solenoid shift of the gears and rheostat control of the motors. Step feeds of limited range previously set at each gear box, have been replaced with a single unit mounted in the control cabinet, giving a range of feed from 0.010 in. to 4 in. in increments of 0.010 in.

To prevent cutter breakage by overloading, there is a power limiting circuit which interrupts the travel motion when a pre-set cutter load is approached.

Another feature is ability to automatically reverse either vertical or horizontal travel motion at the edge of an irregular form or cavity rather than at a fixed length of travel, thus eliminating non-cutting time. This type of reversing can be used at either end of the stroke, at both ends of stroke, or combined with a fixed reversing point at the opposite end of the stroke.

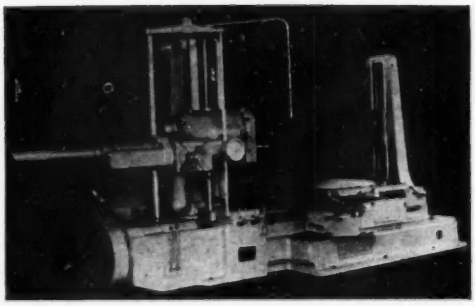
The horizontal spindle construction permits use of a constant flood of coolant to wash the chips from deep cavities. The large unobstructed work table permits direct overhead loading, and permits mounting jobs far beyond the working range of the machine. With the workpiece and model mounted on the same fixture, both can be swiveled or tipped together to get at deep corners. Spindle speeds range from 80 to 3600 rpm.

Practically effortless control of all machine motions is initiated from one centralized newly designed control cabinet, located at the operator's position.

M-13—Horizontal Boring Machine

The New Britain Machine Co., New Britain, Conn., announces that its Lucas Machine Division of Cleveland, Ohio, has completely re-designed and re-styled its 3 and 4 in. spindle series of horizontal boring, drilling and milling machines.

The bed has been extended to support the motor, and speed and feed gear boxes. The number and size of control handles have been reduced, and each one of the controls has been color coded. Feed unit selecting levers indicate direction of feed, and feeds can be combined. The spindle is mounted on anti-friction taper roller bearings and driven at the high speed range by a vibration-free V belt drive. The high spindle speeds permit full advantage of carbide tools. The large



Re-design of Lucas 4-in. horizontal boring machine, Model 428-60

items, please use coupon on PAGE 54

double gear mounted on the spindle sleeve which is the drive for the two lower speed ranges is out of mesh in the high speed range and acts as a flywheel to dampen out vibration.

An automatic power positioning control allows setting up and running through a complete production job by merely inserting master rods. Then through regular operating controls exact settings can be gotten without hand adjustment, for each subsequent operation. This feature is useful in shops where a great number of the same kind of piece is being processed. The automatic power positioning unit allows the operator to go through all his operations without use of any costly jigs or fixtures. Short runs can be done with this automatic power positioning by using standard end measuring rods.

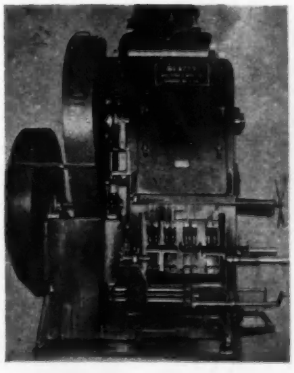
The Lucas machine is built in 3, 4, 5 and 6 inch spindle sizes with a great variety of heights of column, lengths of beds and lengths and widths of table. These machines are offered with two way beds and also four way beds with integrally cast outer ways having hardened strips to support the table and saddle through long cross travel. Three, four and five inch spindle machines are built with lover controls for feed engagement and a movable electric pendant with buttons to remotely control stopping, starting and jogging. The 4, 5 and 6 inch models are also available in electrically controlled machines whereby all motions of every unit are controlled remotely from a separate positionable pendant which can be moved by the operator to any working position.

M-14—Guillotine Beam and Shape Punch

Beatty Machine & Mfg. Co., Hammond, Ind., comes forward with a new guillotine beam and shape punch for punching plates or webs of beams, channels and angles. The unit can also be furnished with special overhang die blocks for punching flanges of small beams and channels.

The machine illustrated is equipped with air operated clamps against adjustable fixed stops, and gag operating levers for operation of the machine from the right side. Punch tools are gagged for selective punching. Other features include adjustable strippers, jaw clutch with auto stop at top of stroke, and anti-friction type flywheel shaft bearings. The illustration shows punching arrangement for punching angles in pairs, beams or channels.

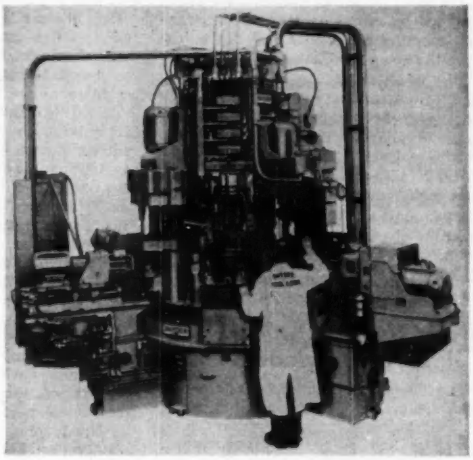
Capacity is 200 tons or four 15/16 in. diam holes through ¾ in. plate. Stroke is 2½ in.; distance between housings, 32 in. Size of the ram, right to left, is 28 in. Size of the ram, front to back, is 13 in. Table, right to left, measures 32 in.; front to back, 21 in. Die space is 26 in.



Beatty guillotine beam and shape punch

M-15—Center Column Drilling Machine

Snyder Tool & Engineering Co., Detroit, Mich., has designed and built a six-station, center column, automatic cycle machine for processing a cast iron converter housing for automatic transmissions. The machine drills, chamfers, reams, counterbores, or taps a total of 51 holes ranging in size from 4 in. diam to F.257, and has a capacity of 114 parts per hr at 100 per cent efficiency. Work cycle is 31½ seconds.



Snyder 6-station center column drilling and tapping machine

After being loaded in Station One the machine is automatically indexed throughout the work cycle. The indexing mechanism is driven by a hydraulic fluid motor which permits variable acceleration and deceleration rate and provides rapid and smooth indexing.

At Station Two, a 4 in. hole is rough counterbored and 10 small holes are bored vertically and horizontally. At Station Three, the 4 in. hole is finish counterbored, and 11 small holes are reamed, chamfered, or drilled at various angles. At Station Four, 9 small holes are drilled or spot drilled. At Station Five, 9 small holes are drilled, reamed or chamfered, and, at Station Six, 10 small holes are tapped.

The 4 in. diam counterboring tool is carbide tipped with the holder guided in a bushing. All other tools are high speed steel. Tool speeds on drilling and chamfering are 80 ft per min, reaming 45 F/M, counterboring 250 F/M, and tapping 20 F/M. Feed rate is 6 in. per min. Snyder standard hydraulic feed units, conforming to J.I.C. Standards, are used throughout.

Multiple spindle heads are driven by 12 motors ranging from 1 hp to 7½ hp, all at 1800 rpm. Gears in the mul-

• PRODUCTION • NEW EQUIPMENT • PLANT •

For additional information regarding any of these items, please use coupon on page 54

tiple spindle heads are SAE 6145 steel, heat treated and shaved for quiet operation. Bushing plates are readily dropped by removing two "C" washers and running the heads back up to expose the tools for changing.

The machine is equipped with racks that gauge the distance from the point of the tool to the back of the adjustable adapter unit. As tools are ground, adjusted, and gauged, they are stacked in the rack ready for use, reducing down time for tool replacement.

The machine is completely interlocked electrically. Lubrication is automatic. Floor space required is 164 ft. by 144 ft.

M-16—Vertical Spindle Surface Grinders

The Thompson Grinder Co. of Springfield, Ohio, announces manufacture of vertical spindle surface grinders in a complete line comprising two types. One, the fixed column type, is for production work without obstructions; the other, called the Hydrovert (sliding column) type, is for production work with obstructions.

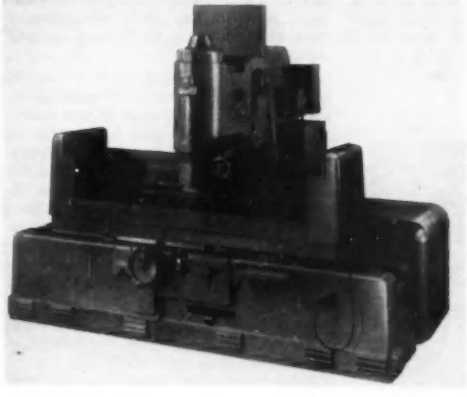
The first type—the vertical spindle (fixed column) surface grinder—is fully hydraulic with simplified circuits. Capable of high stock removal, it incorporates a reciprocating table. Wheelhead is provided with built-in motor construction. Spindle is mounted in preloaded ball bearings for radial load, and spring loaded ball bearings for thrust load—all lifetime lubricated. The unit is dynamically balanced.

Bed is heavily ribbed, with one vee and one flat way, automaticlly lubricated. All beds are double the length of the machine working stroke, eliminating table work-surface overhang.

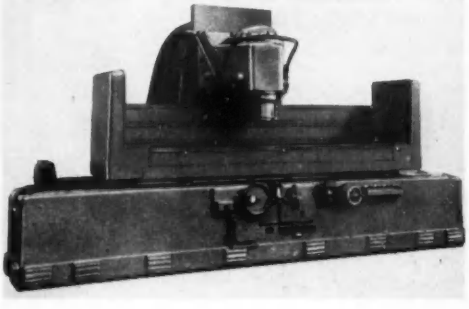
Table automatically slows down before coming to rest at the limit of the cylinder stroke. Table work surface can be positioned completely clear of the wheel at either end of the stroke. The wheel face can be presented in plane with the longitudinal surface of the table, or at any desired angle up to 10 deg. Automatic downfeed is supplied to the wheelhead in increments of 0.0002 in. to 0.004 in. at each reversal of the table.

The second type—the Hydrovert (sliding column) vertical column surface grinder—while having most of the features of the aforementioned machine, overcomes various limitations of this fixed column type. It accommodates wider flat work, work having obstructions, and production work of a multi-level nature. For wide flat surfaces the Hydrovert can use a smaller wheel for deeper cuts and grinding efficiency. It can also use a harder wheel without burning. The sliding column moves to cover work many diameters wider than the largest grinding wheel. This sliding column likewise permits grindng close up to shoulders where there are obstructed surfaces. In die grinding the head gets around guide pins. Additionally, multi-level surfaces are taken "in stride," regardless of other obstacles ordinarily limiting production on a vertical machine.

In operation the Hydrovert column travels back and forth on a sub-base, giving either an intermittent feed at each reversal of the table, or a continuous cross feed, both from single level manipulation. A hydraulic hand cross feed provides for rough setting of the wheel and for grinding close to obstructions or shoulders.

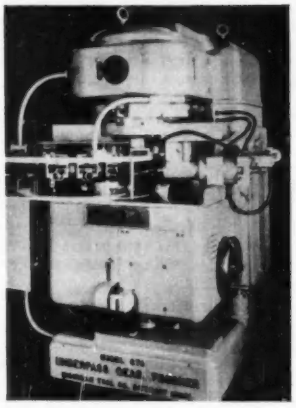


Thompson fixed column vertical spindle surface grinder



Thompson Hydrovert (sliding column) vertical spindle surface grinder

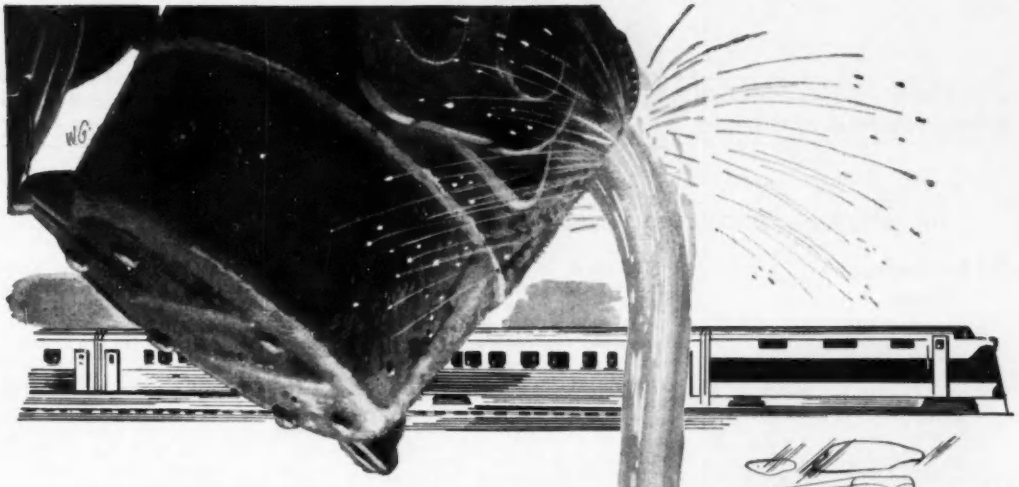
M-17—Conveyor Fed Gear Finisher

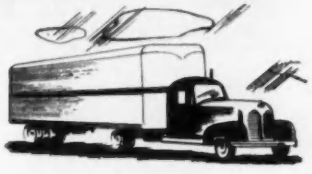


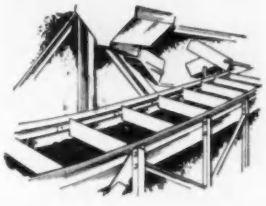
Michigan Tool 870 machine showing how conveyor carries gears through the machine for automatic finishing.

Ability to finish gears automatically without even removing them—manually or mechanically—from a conveyor is among the latest developments in automation developed by Michigan Tool Co., Detroit, Mich. The arrangement permits use of individual or multiple 870 rotary gear finishing machines, operating continuously at peak efficiency. The operator merely places

(*Turn to page* 106, *please*)







cut operating costs, increase payloads —reduce weight or increase strength

with Inland HI-STEEL

Inland HI-STEEL's high strength-to-weight ratio and its abrasion and corrosion resistance permit longer life, weight reductions up to 25%, and greater strength than ordinary structural-grade carbon steel.

These properties permit three different approaches to the problems of design and construction:

1. To design for same strength with reduced weight and greater payloads;
2. To design for greater strength with same weight and payload; and
3. To design for compromises that will allow variations of these qualities.

In each case operating costs of mobile equipment are greatly reduced.

And Inland HI-STEEL can be worked either hot or cold—punched, drawn or otherwise fabricated—welded or riveted—with little or no change in shop practice.

COMPARISON OF AVERAGE PROPERTIES OF HI-STEEL WITH ORDINARY STRUCTURAL GRADE CARBON STEEL

Tensile Properties (¼" Plate)	Inland HI-STEEL	Ordinary Structural Grade Carbon Steel
Yield Point (psi)	56,000	35,000
Ultimate Strength (psi)	73,000	66,000
Elong. in 8" (%)	25	25
Endurance Limit		
Fatigue Strength (psi)	49,000	33,000
Impact Resistance (Charpy Impact—ft. lbs.) Temperature		
80° F	55	36
32° F	43	33
0° F	36	26
—25° F	34	6
—50° F	30	2

INLAND STEEL COMPANY
DEPT. AI7150, 38 S. DEARBORN ST.
CHICAGO, ILLINOIS

Write for Booklet

Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

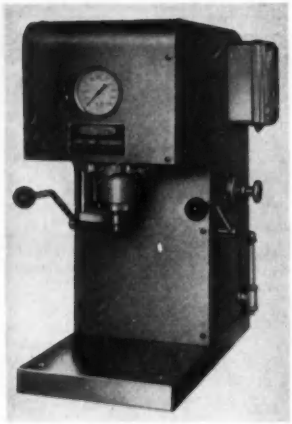
INLAND

OTHER PRODUCTS: BARS • PLATES STRUCTURALS • SHEETS • STRIP • TIN PLATE • SAFETY PLATE • PILING • RAILS • TRACK ACCESSORIES.

NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 54

P-11—Hydraulic Press



Hannifin fast-acting hydraulic "Han-D-Press" in Model F-10 of 1-ton capacity and Model F-20, of 2-ton capacity.

To its line of air-operated "Han-D-Presses"—the ½-ton M-1 and the 1-ton M-2—Hannifin Corp., Chicago, Ill., is adding a hydraulic "Han-D-Press," available as the F-10 (1-ton) or as the F-20 (2-ton). Developed to help speed up light, but often troublesome, production operations—such as staking, marking, broaching, punching, riveting and press-assembly—the new hydraulic "Han-D-Press" is completely self-contained and can be used where compressed air is not available.

Mechanical tamper-proof dual controls are standard. Should an operator tie down either control (to operate the press with one hand), the ram will advance on the first stroke thereafter but will not return, making it impossible to complete the cycle. This same non-return feature when one of the two operating levers is held down allows "inching" the ram and holding it there during set-up work. A 1½ hp, 1800 rpm motor, available in any standard voltage, operates a 3.3 gpm, constant-volume pump. An accessible relief valve permits adjustment of maximum ram pressure, as shown on the gage, directly in front of the operator, to any setting from 10 per cent of capacity to full rated capacity.

Stroke of the new press is 6 in., and gap (or "daylight") is 10 in. Reach is 6 in., and overall height above the bench, 28 in. A removable base permits increasing the amount of "daylight" with an easily made rectangular spacer. The press is also available without base, and a number of these presses can be mounted on a common slab. Ram speed in the F-10 (1-ton) model is 400 ipm with 800 ipm return. Complete unit, including base, weighs less than 500 lbs.

P-12—Safety Switches

Square D safety switch

Announced by Square D Co., Detroit, Mich., is full production on their newly designed 100 and 200 amp safety switch line.

Type A switches for heavy duty industrial service include a full cover interlock that locks the switch "on" or "off." The cover can be locked, with 1, 2, 3 or 4 padlocks of varying sizes and shapes. Current carrying parts of the new switches are silver plated. Blades are visible for quick checking of switch operation. Line terminals are dead-front, protected by a hinged arc chamber. Quick make and break action is assured by simple mechanism with no dead center.

A magnetic plate in the arc chamber cover adds to the high rupturing capacity of the new switches. Jaws and fuse clips are steel reinforced to exert positive pressure. A non-tracking insulation is used in the base. The insulating cross bar is formed of melamine. Pressure connectors are removable, so solder lugs may be used where preferred.

Types C and D switches for standard industrial duty and general purpose duty respectively are similar in appearance and dimensions to Type A, with design and construction details differing to meet service demands.

P-13—Air Line Lubricator

To provide automatic lubrication for tools using 10-60 cfm, Keller Tool Co., Grand Haven, Mich., announces an air line lubricator in two sizes, the larger of which is illustrated.

With the new larger size, lubrication of one or more tools is automatically accomplished, where a minimum of 10 cfm is used by one tool and a maximum of 60 cfm by all tools taking air

(*Turn to page 58, please*)

Keller air line lubricator

TORRINGTON NEEDLE BEARINGS

carry lubricant, too

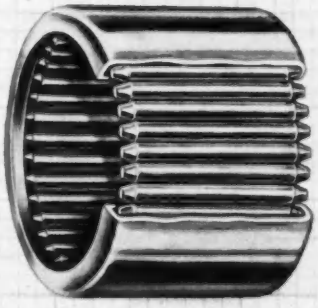
To reduce the need for frequent service attention in all types of machines, Torrington Needle Bearings carry a large reserve of grease or oil.

The turned-in lips of the outer shell ride close to the shaft, and form an effective seal that helps retain lubricant and keep out dust and moisture.

Small diameter rollers carry an even protective film to all bearing contact surfaces.

Often Needle Bearings can be lubricated for life at installation.

Let our engineers help you design efficient lubrication and other Needle Bearing advantages into your product.

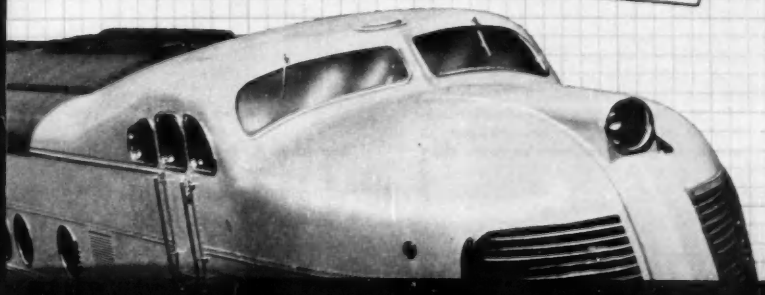


THE TORRINGTON COMPANY

Torrington, Conn. • South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON *NEEDLE* BEARINGS



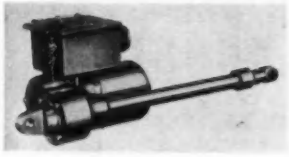
NEEDLE
SPHERICAL ROLLER
TAPERED ROLLER
STRAIGHT ROLLER
BALL
NEEDLE ROLLERS

NEW PRODUCTS for AIRCRAFT

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 54

U-7—Linear Actuator

For positioning valves, flaps, oil cooler shutters, small trim tabs, and other aircraft components, this new



Barber-Coleman linear actuator

compact linear actuator manufactured by Barber-Colman Co., Rockford, Ill., can be installed in control surfaces or other limited spaces. Hardened ground screw and nut with ball thrust bearings are capable of 175 lbs tension or compression loads. Stroke is adjustable up to five in. Bronze bushing eye or self-aligning and shock absorbing bonded rubber connectors are available. Limit switches are accessible for adjustment after actuator installation. Speed reduction is through accurate, machine cutgears. Designed to meet all applicable AN requirements, Barber-Colman linear actuators are available for two position or proportioning control.

U-8—Precision Fixture for Jet Turbine Blades

An 18-column Precisionaire fixture developed by Sheffield Corp. of Dayton, Ohio, makes it possible to 100 per cent inspect jet turbine blades for contour on a production basis. Doing the job in a few seconds—as rapidly as blades can be loaded into and unloaded from gaging position—is said to save tedious laboratory checking formerly done only on a sampling basis.

No expensive minimum or maximum master gages are required for setting the jet blade contour measuring fixture. A selected, carefully calibrated turbine blade is used as a mean master. Gage block buildups are used to properly locate the gaging head mounting plates for the upper, middle and lower

Sheffield 18-column Precisionaire fixture

calibrated points of check. The gage heads are then clamped into proper position and feeler gages are used to set up the Precisionaire base instrument, not for the calibrated blade, but for a theoretical perfect blade. Positions of the floats will then indicate how much the blade being checked varies with a theoretical perfect blade.

The eighteen gaging contact points are placed in contact with the blade—a set of three for the internal (concave) and similar set of three for the external (convex) side at the top, middle and bottom. Positions of the eighteen floats form a graph of the measurement of the blade, readable at a glance. The thickness at any point can be checked by comparing the float position in an external tube with the float position in the corresponding internal tube.

Tolerances on the application illustrated are ± 0.0025 on the internal points of check and ± 0.0075 on the external points. However, a closer tolerance could be checked accurately on this fixture if so desired—or the tolerance could be opened, as the columns for external and internal measurement have a total range respectively of ± 0.020 and 0.010.

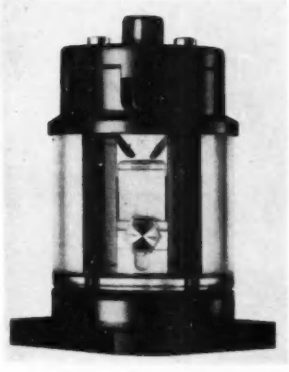
A feature is the complete flexibility and adjustability to accommodate changes of design and a great variety of jet blades without modification. Blades can vary or be changed in width, height or contour by more than an inch and still be accommodated by the gaging fixture. Interchangeable workholders will be required should the root form dimensions change. Adaptations of this fixture can be made for fewer, or more, or different, points of check, for locating the blade at different points, for blades of entirely different shapes—and for completely different types of parts where the same principle can be applied.

Another feature is the new "Plunjet" gaging element. This is a gaging head for single or multiple applications with Sheffield column and dial Precisionaires and Airlectric gaging heads. These elements are very small — approximately 1½ in. long by ½ in. wide by ½ in. high, and can be mounted in almost any position, requiring only a plastic hose connection with a Precisionaire. Once mounted in place, a setting can be made by the use of feeler gages without requiring a master.

U-9—Inertia-Type Crash Switch

The Simmonds Inertia-type crash switch is designed by Simmonds Aerocessories, Inc., Tarrytown, N. Y., to automatically eliminate crash hazards before they assume major proportions. Manufacturing rights were obtained

(*Turn to page* 108, *please*)



Simmonds inertia-type crash switch

Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

L-15 Arbors and Adapters

Scully-Jones and Co.—Milling machine arbors and adapters manufactured by the company are described and illustrated in a new 12-page Bulletin No. 2-50. Shell End Mill Arbors and other adapters are described, including centering plugs, collet holders, cutter adapters, cutter chuck adapters and milling machine sleeves. A new revised net price list is included in the bulletin, together with complete specifications.

L-16 Air Pumps

Leiman Brothers, Inc.—The operation and use of air pumps is fully described and illustrated in Catalog No. 450, issued by the company. The new catalog contains performance curves and specification tables on the 4-wing and 2-wing type air pumps and accessories. A section of the new catalog is devoted to air motors.

L-17 Nickel Alloys

The International Nickel Co., Inc.—Two new technical bulletins on the properties of high nickel alloys are available. Both are 24-page booklets and contain charts, tables on compositions and properties, working instructions and other information of a technical nature. Bulletin T-7 is entitled "Engineering Properties of Inconel." It also contains information on Inconel "X." Technical Bulletin T-9 gives information on the engineering properties of "K" monel and "KR" monel.

L-18 Alkaline Tin Plating

Metal & Thermit Corp.—A new technical bulletin is available on electrotinning. The 24-page pamphlet gives suggested bath formulae and performance data on both potassium and sodium stannate plating solutions; it contains suggestions and instructions for analyzing and controlling the bath and has a section devoted to the new high speed tin anodes recently developed by the company.

L-19 Air Compression

Paramount Compressor Corp. — A new brochure has been issued that describes and illustrates the company's all-purpose, portable air compressor and its principle of operation. Also illustrated are various applications for the compressor and complete specifications.

L-20 Retainers, Punches, Die Buttons

Whitman and Barnes—A new catalog, No. 103, illustrating the company's expanded system of Hercules interchangeable punches, has been announced. A new line of improved die buttons, both press fit and interchangeable Hercules type, is illustrated. A section of the catalog is devoted to illustrations of applications of this system of dies. A stamping pressure chart is included.

L-21 Colloidal Graphite for Metalworking

Acheson Colloids Corp.—Bulletin 426 on the use of "dag" colloidal graphite in metalworking operations is one of a series on the application of "dag" colloidal graphite in numerous industries. Properties are explained and compared with those of regular graphite and conventional lubricants. Specific instruc-

(*Turn to page 70, please*)

TIME SAVER COUPON

THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

Readers' Service Department,
Automotive Industries,
Chestnut & 56th Sts., Philadelphia 39, Pa.

Please send me: **These FREE Publications** (Use letter and designating number of each item desired)	*Please send me more information on:* **New Production and Plant Equipment** (Use letter and designating number of each item desired)	*Please send me more information on:* **New Products** (Use letter and designating number of each item desired)
....	....	....
....	....	....

Your Name ..... Your Title .....

Your Company Connection or Business .....

Address .....
(Street & No.) (City) (Zone) (State)

Practical tolerances for resilient gaskets

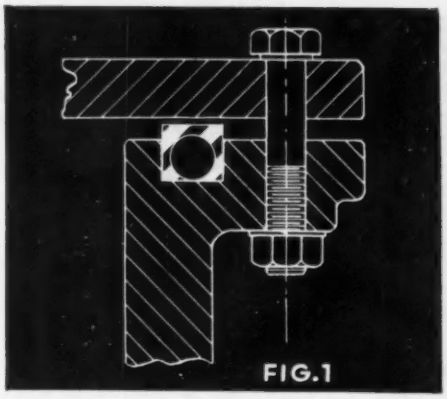


FIG. 1

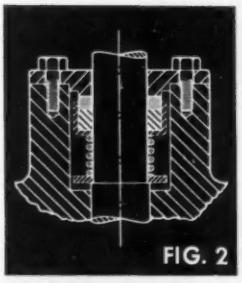


FIG. 2

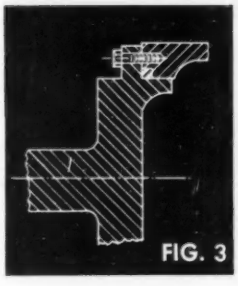


FIG. 3

Close tolerances in resilient gaskets are rarely necessary. During assembly, gaskets are usually compressed to a predetermined thickness or percentage compression. Tolerances do not become critical if the gasket material chosen seals effectively over a wide range of compressions.

Typical of such wide range materials are Armstrong's Cork-and-Rubber Compositions. Their recommended compression range of 20% to 33% largely eliminates the need for gasket tolerances closer than ± .010".

On confined gasket applications, too, close tolerances are unnecessary with cork-and-rubber. Because these materials are truly compressible, they actually decrease in volume under load. This enables gaskets made slightly oversize to compress into a completely confined space without provision for lateral flow.

Figure 1, for example, illustrates the relative size of the cork-and-rubber gasket and the comparable non-compressible molded ring. Wide tolerances obviously would have much less effect on the greater thickness of the cork-and-rubber composition.

Likewise in figure 2, wide tolerance cork-and-rubber gaskets make an effective packing ring. Their true compressibility controls lateral flow and prevents excessive build-up of radial pressure on the shaft.

Non-compressible rings on the flanged journal of a calender roll in figure 3 required extremely close tolerances. Undersized rings leaked. Oversized rings prevented metal-to-metal contact between the flanges and caused misalignment. Both of these problems were solved with standard tolerance cork-and-rubber rings.

Wide tolerances are but one type of saving made possible by Armstrong's Cork-and-Rubber. We suggest that you call your Armstrong representative. He can help put these versatile materials to work on your application.

Send for this Gasket Handbook

You'll find useful application and specification data in the revised 24-page booklet, "Armstrong's Gasket and Sealing Materials." It contains up-to-date information on straight synthetic rubber, cork-and-synthetic-rubber, and cork composition gasket and sealing materials.

This booklet includes ten technical discussions of the factors influencing modern gasket and joint design. It also suggests methods of putting Armstrong's stock materials to specialized uses in such fields as radio, electrical, automotive, petroleum, and transportation industries.

For your free gasket handbook, fill in coupon at right and mail today.

ARMSTRONG'S
GASKETS • PACKINGS • SEALS

ARMSTRONG CORK CO.
Gaskets and Packings Dept.
1507 Arch Street, Lancaster, Pa.

Please send me at once a free copy of the new 24-page booklet, "Armstrong's Gasket and Sealing Materials."

NAME .....
COMPANY .....
ADDRESS .....
CITY ..... STATE .....

Observations

By Joseph Geschelin

Turbine Power

Recent news stories have featured applications of gas turbines in a British passenger car; and a heavy duty motor truck on the West Coast. It is important to appreciate that these are purely experimental ventures designed to demonstrate the possibility of driving vehicles with gas turbines. Much more development is needed before this type of power plant can hope to supplant the reciprocating engine. Noise, fuel economy, and manufacturing cost are among the problems still awaiting solution.

Nuclear Power

Unlike the man on the street, it is doubtful whether the engineer has taken seriously the prospect of using nuclear energy—the atom engine—for vehicle propulsion. Yet one can hardly blame the man of the street, considering the Sunday Supplement stuff that has appeared in recent years. It is common knowledge that the government has subsidized enormous projects designed to harness nuclear energy for industrial powerplant uses. Large stationary installations of this kind appear to have practical possibilities, once the many troublesome engineering problems have been solved. The same applies to military powerplants for ships, submarmines, and large aircraft. But for trucks and buses and motor cars—it's still quite remote.

Hydraulic Presses

The hydraulic press has many applications in the automotive industries. The widening use of plastics, powder metal parts, and extrusions should open the way for greater exploitation of this versatile equipment. It has particular interest in the production of buckets and vanes for jet turbines.

Pure Moly

A recent advertisement by Distillation Products Industries of Rochester touches on one of the important developments in the production of jet engines. It describes the melting of high purity molybdenum in high vacuum ovens at a temperature of 4750F with oxidation and entrapped gases held to the minimum, producing molybdenum which can be cast or sintered into sizable masses with the ductility and malleability necessary for making high precision parts. Such techniques have made possible forged blading for high performance jet engines.

Machinery Replacement

There is no denying that a study of old machines—many are 20 to 30 years old in automotive plants—requires use of some sound formula to justify replacement. The fact is, however, that in many well operated plants there is a paucity of documented data on existing equipment. One must know, for example, how much it costs to maintain the old machine; how often it breaks down and for how long; and how many rejects it produces. Surprisingly enough, there are plants which do not have records of this kind. They do not know exactly how much money is being wasted by the old machines. Here is an excellent opportunity for some good record keeping.

Automatic Cycling

One machine tool builder specializing in automatic lathes with tracer controls is introducing many wrinkles of great importance to automotive producers. For example, this manufacturer is building some lathes with double templates—one for roughing, the other for finishing. The tracer goes through roughing, returns quickly and initiates the finishing cycle. Another significant development is an automatic magazine feed which stores shafts, loads them on centers, and unloads without operator supervision. These machines are gluttons when it comes to metal removal and are a natural for mass production applications.

Sixes vs Eights

Current announcement by Olds to the effect that its Six will be discontinued this year marks an interesting slant on the traditional battle of the sixes and eights. More than that it scratches one of the possible proponents of the V-6.

E-Z-Eye Glass

Buick has finally adopted the tinted E-Z-Eye glass as optional equipment at the buyer's request. Besides eliminating glare this type of glass also absorbs a considerable percentage of heat, thus giving real comfort and safety. Buick was ready about a year ago but was forced to delay action until a good percentage of the states gave approval in their motor vehicle code. We understand that 20 states now have given the nod.

Hood Latch

With the introduction of the Special series some time back Buick adopted a new wrinkle in hood latching—the use of a separate key. While this may have cut cost to some extent, it required an extra pocket on the side trim pane for holding the key. Perhaps, too, some keys have been lost or misplaced by the owner. At any rate, all Buicks now have conventional hood latching with an interior control on both sides.

What's Wear

The compatibility of mating and wearing surfaces was under discussion at a SAE French Lick round table session. Here we have phenomena that defy generalization, require experimental evidence and considerable emipirical knowledge. For example, depending upon operating conditions and engine size, in some instances ring lands wear without appreciable wear of rings, while in other cases rings wear with practically no effect on the piston. One interesting solution for ring land wear is the use of a Ni-Resist insert in aluminum pistons. An application of this is done by the Al-Fin technique. (See AUTOMOTIVE INDUSTRIES, Nov. 15, 1949.)

Cooling System

The round table on this subject at French Lick indicated that some passenger car manufacturers were experimenting with 25 and 40-lb pressure-sealed radiators. Discussion also touched on "free flow" in radiator cores, emphasizing the need for eliminating restrictions in the form of sharp bends and restricted outlet connections.

Power Steer

Three cars at French Lick—Cadillac, Buick, and Studebaker—owned by steering gear manufacturers proved that power steering for passenger cars is 'way past the talking stage. At least two of these used the Bendix hydraulic system built into the steering gear. It is nothing short of re-

(*Turn to page* 100, *please*)


We never forget, either
Sealed Power
PISTON RINGS · PISTONS
CYLINDER SLEEVES

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 54

(*Continued from page* 50)
through the lubricator.

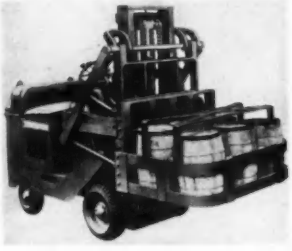
A transparent Plexene bowl, designed to hold 6 oz of light oil, provides oil feed through a porous bronze wick. When used with a 35 cfm tool, the bowl holds enough oil for 8 to 10 weeks of lubrication under normal usage. No regulation of the oil flow is necessary.

The quantity of oil dispensed into the air stream is dependent upon the amount of air passing the wick. Several tools operating from one lubricator will automatically draw more oil than just a single tool. Under normal conditions, pressure drop through the lubricator will not exceed 1 lb per sq. in.

Installation of the new air line lubricator is made by screwing the device into a ½-in. air line ahead of the tool to be lubricated. A removable hex nut with holding chain permits easy refilling.

P-14—Hydraulic Keg Handling Device

Latest materials handling development of Towmotor Corp., Cleveland, Ohio, picks up, transports, stacks and unloads—without a pallet—six 200-lb kegs of spikes in a single maneuver. To pick up a load, a guide frame mounted on a Towmotor unloader accessory with



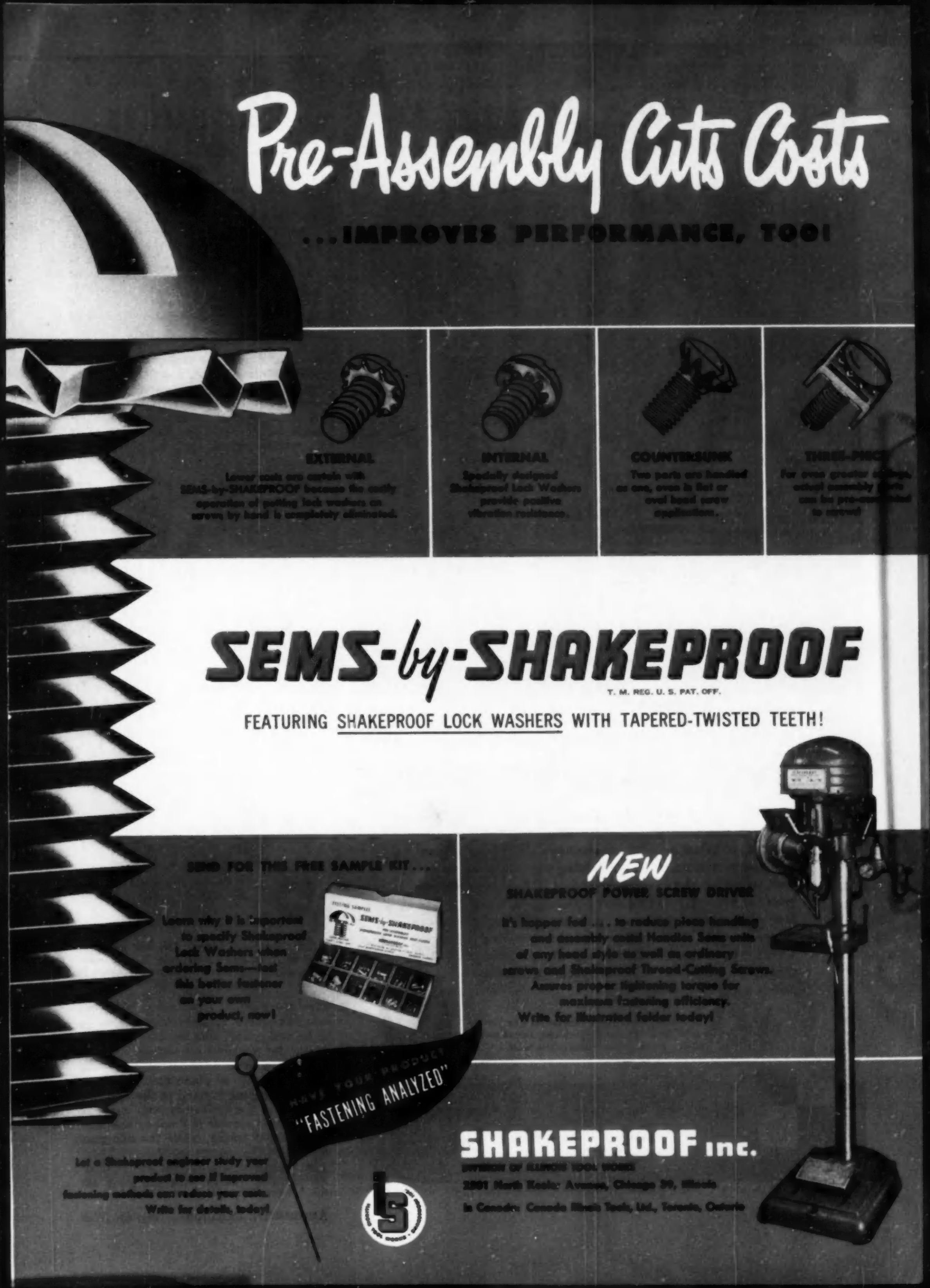
Towmotor hydraulic keg handling device, Model LT-44

10 in. stroke is lowered over the kegs; as the unloader is retracted the guide frame pulls the kegs against three rubber-covered shoes which project from the face of the carriage. Held securely in position by the guide frame, the six kegs are firmly pressed against the projecting shoes. Need for a flat carrying plate is eliminated. Because both shoes and guide frame are detachable this Model LT-44 Towmotor lift truck can be used with standard forks.

P-15—Magnetic-Particle Clutch

The first commercially-usable magnetic-particle clutches have been introduced by the Vickers Electric Division, Vickers, Inc., St. Louis, Mo., with its new line of Magneclutches and Magnebrakes. First developed for use by the Navy for operation of shipboard equipment such as radar, sonar, fire control and other devices, Vickers Magneclutches and magnebrakes are now in production for use by industry for control of torque, speed and position.

The Vickers Magneclutch is a controllable coupling which utilizes the


Pre-Assembly Cuts Costs
...IMPROVES PERFORMANCE, TOO!
EXTERNAL
Lower costs are certain with SEMS-by-SHAKEPROOF because the costly operation of putting lock washers on screws by hand is completely eliminated.
INTERNAL
Specially designed Shakeproof Lock Washers provide positive vibration resistance.
COUNTERSUNK
Two parts are handled as one, even in flat or oval head screw applications.
SEMS-by-SHAKEPROOF
T. M. REG. U. S. PAT. OFF.
FEATURING SHAKEPROOF LOCK WASHERS WITH TAPERED-TWISTED TEETH!
SEND FOR THIS FREE SAMPLE KIT...
Learn why it is important to specify Shakeproof Lock Washers when ordering Sems—test this better fastener on your own product, now!
NEW
SHAKEPROOF POWER SCREW DRIVER
It's hopper fed .... to reduce piece handling and assembly costs! Handles Sems units of any head style as well as ordinary screws and Shakeproof Thread-Cutting Screws. Assures proper tightening torque for maximum fastening efficiency. Write for illustrated folder today!
HAVE YOUR PRODUCT "FASTENING ANALYZED"
Let a Shakeproof engineer study your product to see if improved fastening methods can reduce your costs. Write for details, today!
SHAKEPROOF inc.
DIVISION OF ILLINOIS TOOL WORKS
2501 North Keeler Avenue, Chicago 39, Illinois
In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario

NEW PRODUCTS

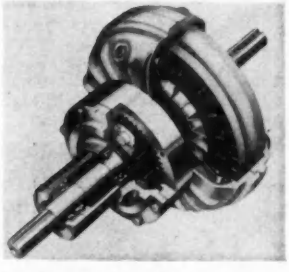
For additional information please use coupon on page 54

linking action of a dry magnetic mixture in a magnetic field between driving and driven parts to transmit torque. The magnetic mixture is composed of iron particles and flake graphite. The magnetic field is established by current flowing through a coil; by varying the current, the degree of clutching can be controlled.

Indicative of potential widespread industrial usage, the new Vickers clutch provides small control power with extremely fast response, no wear on torque transmitting surfaces, torque at zero slip, large maximum to minimum torque ratio and easy adaptation to remote control.

P-16—Tension and Lineal Speed Control

The Hydro-Wynd, a development of the Twin Disc Clutch Co. of Racine, Wis., is said to solve the problem of maintaining constant tension and lineal speed on various winding operations. Designed to eliminate jerkiness by automatically maintaining predetermined speed and tension without intermittent adjustment, this Hydro-Wynd is expected to find application in the printing industry (paper winding); in paper making (roll winding); in plastics (winding and stirring); in



Twin Disc Hydro-Wynd. This unit was referred to in error as the Twin Disc Hydro-Sheave in the June 1 issue of Automotive Industries, page 60.

wire winding; in chemical stirring operations where material consistency is to be controlled; and in the textile industry for winding operations.

The new drive combines an hydraulic coupling with a planetary gear set, whose ring gear is fixed to the impeller or pump of the hydraulic coupling. The planet gear carrier is fixed to the runner of the coupling, while the sun gear is fixed to the output shaft.

In operation, the automatic "slip" of the coupling reacts with the gear set

where horsepower goes to work

Fuller TRANSMISSIONS

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 54

against the varying torque and speed requirements of the winding spool to allow the Hydro-Wynd to replace adjustable slip clutches or other devices formerly used.

As the torque load increases or decreases, the Hydro-Wynd increases or decreases output torque—rather than horsepower—directly proportioned to the load imposed, much as is the case with an hydraulic converter.

The result is said to be an extremely smooth, fast start, providing continuous operation at predetermined lineal speeds and tension, without adjustments.

The hydraulic feature also is said to permit operation at stall under some conditions over long periods without harm to either the prime mover or to the Hydro-Wynd.

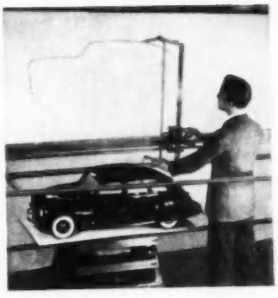
On applications where controlled tension is necessary despite day-to-day changes in materials, weights or speeds, a variable speed drive is used with the Hydro-Wynd. When predetermined speeds and tensions have been set, further adjustments are declared unnecessary.

P-17—Contour Duplicating Device

A device permitting reproduction on paper of the exact contour of irregular surfaces in a fraction of the time required by the former laborious method of cutting and fitting wood templates has recently been placed on the market by Inter-Lakes Engineering Co., Detroit, Mich.

Called the "Dupligraph," the instrument transfers on transparent paper the exact contour of a plastic or clay model, such as the motor car model here illustrated.

Use of the Dupligraph is advantageous for securing concave readings in forming dies which frequently cannot be checked with ordinary templates. It also solves the problem of securing a true reading of a stamping, die-casting, jet blade, etc., showing the amount of spring-back and warp.



Inter-Lakes Engineering contour duplicating device, the Dupligraph

In the manufacture of products which require the close following of models, the Dupligraph replaces an inspector's time, as it gives cross-section lines relative to each other. This is usually done on vellum and checked against the draft or layout. The result is a full contour line as compared with only a spot dimensional check by the former method.

(*Turn to page 69, please*)

a product of imagination . . .

. . . with an ideal combination of electrical and mechanical properties

By working alongside folks like yourself—at design desks, workbenches, and in laboratories—we've acquired a good idea of the time, care, and imagination you pour into the engineering and production of your products. The thick-skinned insulation tube for an expulsion fuse shown here is a good example. The manufacturer wanted moisture resistance, high strength, weather resistance *plus* excellent arc resistance—all wrapped up in a material that was easy to machine. Working with him, and using a little imagination, C-D engineers came up with *two* different plastics: Laminated Dilecto Tubing for the wall, and Vulcanized Fibre for the core.

It's another example of how you, too, can depend upon C-D to engineer the right laminated plastic for your needs. For C-D has no "axe to grind." We can recommend from five basic plastics subdivided into a remarkably wide range of grades and combinations of grades to supply almost *any combination* of mechanical, electrical, and chemical characteristics. For *this* kind of help and imagination, call your nearest C-D office, any time.

your partner in producing better products

CELORON (Molded High-Strength Plastic)
MICABOND (Bonded Mica Splittings)
DIAMOND FIBRE (Vulcanized Fibre)
VULCOID (Resin Impregnated Fibre)
DILECTO (Laminated Thermosetting Plastic)

DE-4-50

BRANCH OFFICES: NEW YORK 17 • CLEVELAND 14 • CHICAGO 11 • SPARTANBURG, S. C. • SALES OFFICES IN PRINCIPAL CITIES.
WEST COAST REPRESENTATIVE: MARWOOD LTD., SAN FRANCISCO 3 • IN CANADA: DIAMOND STATE FIBRE CO. OF CANADA, LTD., TORONTO 8

Continental-Diamond FIBRE COMPANY

Established 1895 . . Manufacturers of Laminated Plastics since 1911—NEWARK 2 • DELAWARE

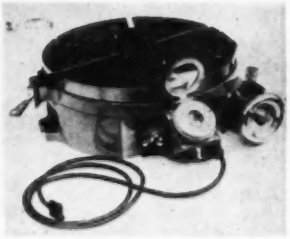
NEW PRODUCTS

For additional information please use coupon on page 54

(*Continued from page 62*)

P-18—Rotary Indexing Table

The F. T. Griswold Mfg. Co., Wayne, Pa., has brought out a new 16 in. diam rotary indexing table as an addition to their line of OPL optically controlled measuring devices. Intended for use on the larger size milling machines, jig borers and grinders, the OPL model 16 table is a high precision indexing device set entirely by means of the built in optical control. This optical control enables angular settings in degrees, minutes and seconds to be made from a master graduated reference drum enclosed inside the table and solidly mounted to the rotating platen.



Griswold model 160PL rotary indexing table

The master reference drum—of large diameter—permits of extremely accurate angular movements. Spindle runout is held to within 0.0002 in. and the maximum error of indexing will not exceed 0.0005 in. measured at the periphery of the 16 in. diam platen.

Overall height of the table is 5¾ in.; weight is 175 lbs. Body is alloy cast iron. Platen drive is two speed. The platen is clamped throughout the entire circumference. Taper centering hole is provided, as well as "00" precision anti-friction bearings. Declutching is provided for the platen drive; and tee-slots are provided for the work mounting.

P-19—Crack Resisting Natural Rubber

A type of natural rubber known as USF, and claimed to have up to forty per cent better resistance to cracking than ordinary rubber is being produced by the United States Rubber Co., New York, N. Y. Described as cleaner, softer and more uniform in character

(*Turn to page 96, please*)

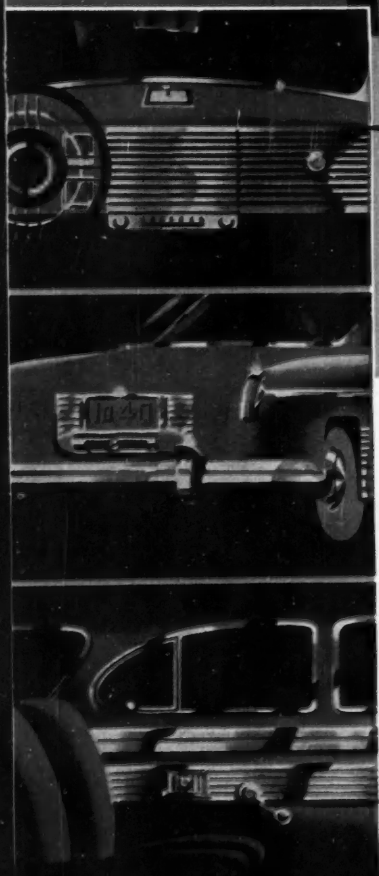
for "eye-appeal" beauty

and "buy-appeal" value

add the gleam of

Superior Stainless

to your pace-setting cars' good looks!



Brightwork of Superior Stainless *stays* bright for the life of the car. Its fine appearance helps sway the initial buying decision—its year-after-year sparkle continues ownership's pride! • And because the fabricator gets the exact widths, thicknesses and tempers he desires in easy handling coils, Superior Stainless speeds volume production at low cost! May we give you the significant facts?

Superior Steel

CORPORATION

CARNEGIE, PENNSYLVANIA

"Sems" maker cuts tool costs; lengthens production runs 10 to 40%

If you want to cut production costs, a good starting point is improved heat treatment of production tools. That's the experience of many firms including Butcher & Hart Mfg. Co., Toledo manufacturer of fastenings.

Until recently, Butcher & Hart's heading dies, thread rollers and other tools were heat treated by methods which did not always give long production life. Inevitably, the short-lived tools caused down time and lost production. Such rising costs led the firm to ask their business contacts about ways of heat-treating for uniformly longer life. Getting excellent reports of Vapocarb Hump Hardening and Homo Tempering results, Butcher & Hart proceeded to install the equipment.

Tool troubles vanished. The heat-treaters soon found that the equipment would help them make the most of their skill and experience. Tools and dies coming from the L&N furnaces began to meet all specifications and lasted a great deal longer. Cold heading dies, such as the one shown, for example, now permit the heading machines to run from 10 to 40% longer than before without shutdowns for retooling. Production from other machines is correspondingly increased.

Results such as these have occurred in hundreds of plants using L&N equipment. For information, or for suggestions on your specific problem, write Leeds & Northrup Co., 4966 Stenton Ave., Phila. 44, Penna.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jrl Ad T-620(29)

Will Low Priced Car Be Turbine Powered?

(*Continued from page* 41)

revolution in aircraft power is not complete, but it is certainly well on the way!

True, there are great differences between the airplane and automobile and each vehicle has its special characteristics of engineering and production know-how. Aircraft engine development has always been shaped by demand for more power without more weight. This the gas turbine has given from its beginning in so much greater measure that all other considerations have been overshadowed. Some such decisive improvement is probably necessary if the gas turbine is to invade the automotive field, and the author suggests that the major improvement lies in the low manufacturing cost potentialties of the turbine.

The automotive engine has slowly but surely followed the path of the aircraft piston engine toward mechanical complexity. As in aircraft engines there is a wide open invitation for a brand new deal. But in the automotive industry manufacturing cost will undoubtedly be a much more compelling reason for a major change, than performance or mechanical simplicity as such.

It takes a little imagination to see low cost productions in the current gas turbine engine. Most of the parts, simple and small in number though they are, require expensive materials and expensive manufacturing processes. Most important example of this is the turbine wheel which is the heart of the machine. The wheel shown in the accompanying illustration is only 7 in. in diameter and consists merely of a stub shaft and a solid forged steel disk with 64 precision cast blades welded to it. This finished part by itself costs more to produce at the present time than today's complete automobile.

With comparable tooling and similar production quantities the cost of this wheel would of course be much lower, but it would still be in a price range about equal to the cost of the present automobile engine complete with all attachments. The reasons for this are important to understand in order to properly evaluate the future prospects. First, the high temperature alloys used are expensive and second, the methods of fabrication involve relatively new techniques and new skills. A further large contribution to present costs lies in the elaborate inspection procedures necessary to be sure of best possible quality. There are no less than 12 separate X-ray, Zyglo, sonic and magnaflux inspections in processing this wheel. Aside from dimensional inspections there are also exacting balancing and spin proof tests performed before assembly into the turbine engine.

It has already been demonstrated that with use of these fancy inspection procedures turbine wheels can be thoroughly dependable, more so than a piston engine exhaust valve, for example. But without these controls a turbine wheel can be as dangerous as an armor piercing artillery shell. The defects which these inspections uncover tend to result in a high rejection rate. The ultimate purpose, of course, is to steer the processing of the materials into a routine which will be a guarantee of flawless parts.

It is surely a mistake to assume that these requirements are a fundamental barrier to low cost for turbine wheels. More properly the present gas turbine situation should be compared to the beginning of the gasoline engine 50 years ago, when engines though simple mechanically, and crudely built by today's standards, were very expensive to produce in terms of man-hours. What was lacking then in piston engine design,

(*Turn to page* 68, *please*)

and is lacking now in turbine engine design is precise knowledge of the design requirements. This can be obtained only by running the engine with careful attention to its behavior, using plenty of instrumentation. In other words the turbine engine needs experimental testing to establish the significant design criteria.

The trouble now is that the turbine wheel does not understand that it is supposed to operate with such and such temperature gradiant as had to be assumed in the original design, or that its shaft is running on infinitely rigid bearings because this makes possible solution of the analytical mathematics, or that the disk and blades are not to vibrate as of course the calculated stresses had to assume.

Some of the other problems that have to be answered by testing in order to achieve the low cost wheel, are:

1. Can turbine blades be welded to the disks with 100 per cent dependability and low rejection rates in quantity production? There is a considerable background of experience on this subject from turbo-supercharger manufacture but elimination of built-in weld cracks has led welding researchers through a tantalizing and elusive trail. In the meantime welded blade wheels have done surprisingly well with these built-in cracks, located (of all places!) in the highly stressed and hot running wheel rim.

2. Can equal or better durability with lower cost be obtained by casting the wheels, or by using mechanical blade joints?

3. Can occasional disk failures be avoided with absolute certainty in quantity production and, if not, how much and what kind of armor will be required to prevent a wheel burst from jeopardizing the safety of operating personnel? This is one problem, among others which will probably be easier of solution with small gas turbines than with large, nevertheless it becomes an important consideration where low cost and high production are objectives.

4. Are the very best and most expensive high temperature alloys really necessary for small turbine wheel rims, hubs and blades? There is already evidence that in our zeal for durability and safety, the wheels are probably "overdesigned" in some respects.

Once the determining design criteria are established by testing, for these and other questions, the production processing can be greatly simplified. At the same time wheel durability will undoubtedly further improve, even at higher gas temperatures than now used. Rapid progress has already been made in this direction. Of significant importance is the fact that this has been done on small turbines with research development costs amounting to a small fraction of what has been spent on large gas turbines.

It is easy to be overoptimistic on new developments because unforeseen prob-

(*Turn to page 70, please*)

lems continually arise, yet there are very good reasons to believe that small turbine wheels will be produced before long for about the same cost as an automobile engine crankshaft, probably less eventually.

Low production cost for the remaining parts of the turbine engine will be relatively easy, because they do not in most cases, involve unconventional techniques. Furthermore, there are not very many other parts. Fabrication of stainless sheet metal for burners and nozzle boxes will prove very messy for shops used to handling cast iron or low alloy stampings, but there is a large amount of the required know-how in the aircraft industry.

It is not unreasonable to expect small gas turbine engines to be built complete with transmissions for about the same space volume, weight and price as the automatic transmissions in the latest automobiles.

There is, of course, plenty of engineering development required on the turbine before this transformation becomes a fact. The most difficult problem would seem to be that of achieving equivalent fuel consumption. Even this, however, may not take as long as has been supposed, if full advantage is taken of the weight saving inherent in the turbine.

The table illustrates the large weight reduction possible if the chassis and body were to be designed to match the light weight turbine engine. Weight savings of this order are in the range to realize competitive fuel costs with present turbine efficiencies.

Perhaps the toughest problem in connection with the use of gas turbines in the automotive industry will be one of accommodation to a completely different type of machine. It takes quite a while, for instance, to get used to the fact that 10,000 rpm is a low idle speed. Actually this is so for a small turbine, and the stresses and temperature at this speed are negligible in the same way as in a piston engine ticking over at 300 rpm.

Publications Available

(*Continued from page* 54)

tions are given for the use of Aquadag, Prodag, Oildag and Glydag in forging, wire drawing, piercing, broaching, etc.

L-22 Single Spindle Disc Grinders

Mattison Machine Works — Bulletin 546-2RM describes and illustrates the company's single spindle disc grinders. Full details and specifications are given in the circular.

L-23 Thread Ring Gages

Pratt & Whitney—An informative circular, No. 517, illustrates and describes the Carbide Dualock Adjustable Thread Ring Gages, newly manufactured by the company. The gages are designed for long production runs, close tolerance work, etc.

L-24 Self-Tapping Screws

Parker-Kalon Corp. — An attractive 2-color catalog contains information and illustrations on the company's products. Reference data, application information for the various types of products, company facilities for handling various jobs, material charts and weight charts are included.

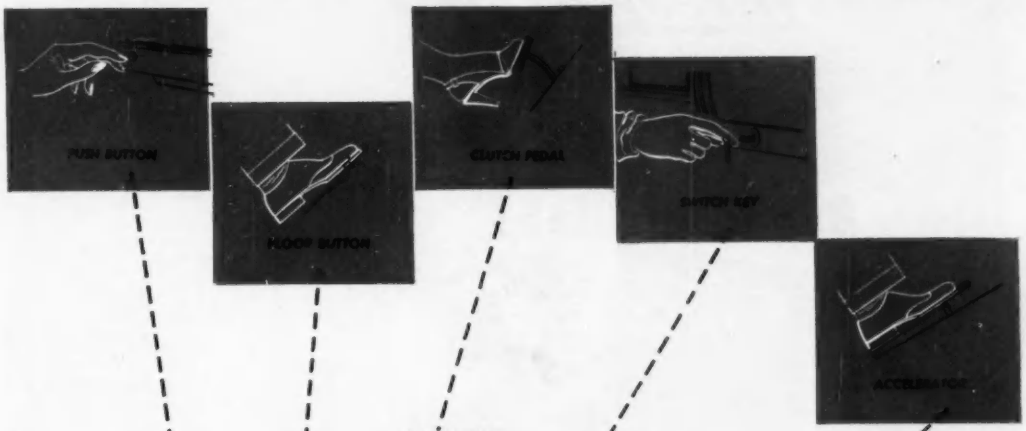
L-25 Air Cylinders

Lindberg Engineering Co.—The complete line of Lindberg Air Cylinders is described and illustrated in a new 16-page booklet, No. 731. Features are listed, together with capacity and weight charts.

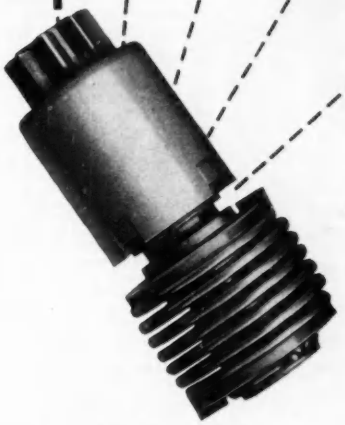
L-26 Precision Saws

The L. S. Starrett Co.—Bulletin No. 1103 contains complete listings of available sizes of the company's Precision Ground Flat Stock and Die Stock, Oil Hardening, Oil and Water Hardening and Water Hardening types of saws. New and useful information on structure and analysis, heat treatment and tempering are included in the bulletin.

SPECIALISTS IN ALL TYPES OF STARTING



OVER 80,000,000 INSTALLATIONS prove its VERSATILITY and RELIABILITY



Bendix

STARTER DRIVE

ECLIPSE MACHINE DIVISION of Bendix AVIATION CORPORATION

ELMIRA, NEW YORK

Detroit Office: 8-212 General Motors Bldg.

Export Sales: Bendix International Division, 72 Fifth Avenue, N. Y. 11, N. Y.

When Industry endorses a product to the extent of 80 *million* installations, little need be added—that product is proved beyond question. This record has been achieved by the Bendix* Starter Drive. Its versatility, reliability and economy have made it the overwhelming choice for push button, floor button, clutch pedal, accelerator and automatic starting applications. No matter which kind of starting you employ, insist on *known* quality, specify Bendix Starter Drives—the best proved in the industry. *REG. U. S. PAT. OFF.

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

General business activity rose slightly during the week ended June 24. Increases were reported in electric power production, bituminous coal production, crude oil output, railway freight loadings, and construction, while department store sales declined. The *New York Times* index of activity for the week ended June 17 stands at 161.4, a new postwar peak. The index was 160.8 for the preceding week and 139.7 a year ago.

Electric power production advanced during the week ended June 24. At 6102 million kilowatt hours, output was 11.9 per cent above the corresponding amount in 1949, as compared with an advance of 11.6 per cent shown in the preceding week.

Production of bituminous coal and lignite during the same week is estimated at 10,550,000 net tons, 35,000 more than the output in the week before but 1,384,000 below the corresponding amount a year earlier.

Crude oil output in the week ended June 24 averaged 5,354,750 barrels daily, 7350 more than in the preceding week and 410,700 above the comparable production a year ago.

Railway freight loadings during the same period totaled 810,152 cars, 0.6 per cent more than the figure for the week before and 0.9 per cent more than the corresponding number recorded in 1949.

Engineering construction volume reported for the week ended June 29, according to *Engineering News-Record*, was $287,582,000, or 32 per cent above the average for the preceding weeks of this year. The total recorded since the beginning of the year was 44 per cent more than that of the same period of 1949.

Sales of department stores in the week ended June 24, as reported by the Federal Reserve Board, were 250 per cent of the 1935-39 average, as compared with 302 in the week before. At this level, the volume of sales was one per cent more than in the corresponding week of last year, while the total reported since the beginning of the year was two per cent below the comparable sum in 1949.

The wholesale price index of the Bureau of Labor Statistics during the week ended June 20, at 157.1 per cent of the 1926 average, was 0.3 per cent more than in the preceding week and 2.3 per cent above the corresponding figure of a year ago.

Member-bank reserve balances declined $181 million during the week ended June 28. Underlying changes thus reflected include increases of $306 million in Reserve bank credit, $40 million in non-member deposits and other Federal Reserve accounts, $100 million in money in circulation, and $12 million in Treasury cash. Increases of $337 million in Treasury deposits with Reserve banks and $4 million in Treasury currency were also reported.

Total loans and investments of reporting member banks advanced $544 million during the week ended June 21. An increase of $73 million in commercial, industrial, and agricultural loans was recorded. Total business loans, at $13,532,000, were $240 million above the comparable sum a year ago.

Specify JOHNSON *Bronze-on-Steel Bearings*

FOR QUALITY, UNIFORMITY AND SERVICE

THESE JOHNSON BEARINGS are well known in the automotive industry . . . and are recognized as low-cost bearings which give long, troublefree performance. Johnson Bronze-on-Steel Bearings are manufactured by bonding pre-cast bearing bronze powder to strip steel, then forming to the required shapes. This method combines an ideal alloy for the bearing surface with the strength and hardness of steel backing. They have a higher Brinell hardness than cast bronze, much greater resistance to pounding and shock, and a comparatively low coefficient of friction.

Enlarged facilities, now being installed, for producing Bronze-on-Steel Bearings will make this line of Johnson Bearings even more readily available for you. Write today for complete information.

for the ENGINEER

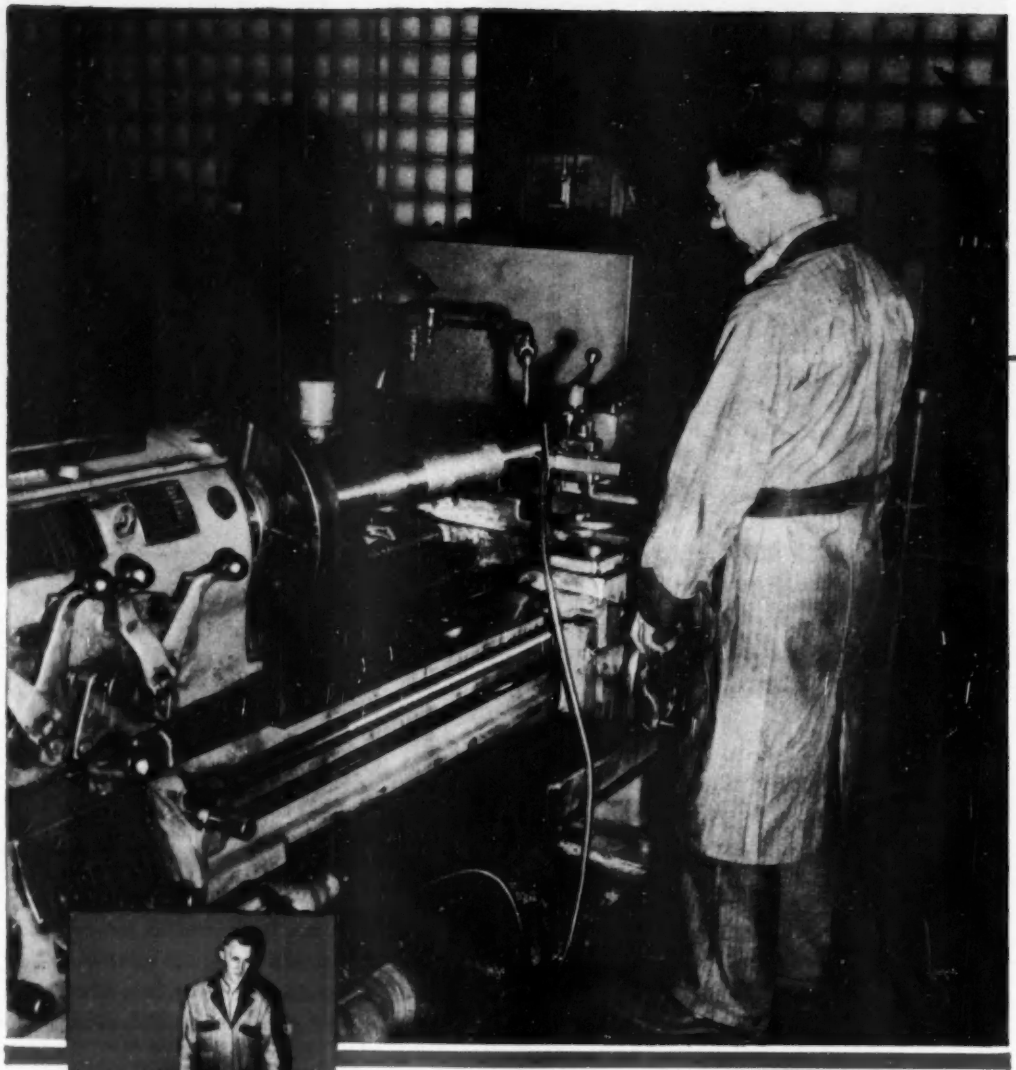
Bearing data sheets which cover the fundamentals of Sleeve Type Bearings are available at no cost. They are written by Johnson Engineers. Write for complete set today.

Johnson Bronze

SLEEVE BEARING HEADQUARTERS

625 SOUTH MILL STREET · NEW CASTLE, PA.

Looking for better production



Here, a change to Free-Cutting CARILLOY FC

—increased production 14%

—increased tool life 300%

In producing the drum shaft for the winch of their famous "PIPE LAYER," Trackson Company, Milwaukee, formerly used 4¼" round bars heat treated to 269-321 Brinnel. This vital part requires considerable machining to very close tolerances. Machining difficulties and low tool life ran up the cost and slowed production.

One of our metallurgists suggested the use of Carilloy FC. It worked like a charm, gave better machinability and better mechanical properties as well. Now they turn out more and *better* drum shafts and tools last four times as long.

on heavy-duty machined parts?

Speed up output and lower your costs with

U·S·S Carilloy FC

IF you are producing heavy-duty shafting or similar parts that require considerable machining and that must have tensile strength as high as 125,000 to 175,000 lbs. per sq. in. for heavy-duty service, U·S·S Carilloy FC offers you important advantages.

Carilloy FC is a deep hardening grade of manganese-chrome-moly steel. When heat treated to meet high mechanical property requirements, it will give you machinability and surface finish that *far excel* that of other alloy steels of comparable strength and hardness.

It is this feature of Carilloy FC that makes it so desirable from a production standpoint. For by buying Carilloy FC heat treated to your strength or hardness requirements, you obtain not only excellent machinability and tool life but you *eliminate the need for heat treatment after machining.*

Used in this way, Carilloy FC speeds up production, reduces costs, saves time and keeps reject losses to a minimum by eliminating the hazards of scaling and distortion. And, most important, Carilloy FC costs only a fraction of a cent more per pound than ordinary thorough-hardening alloy steels.

U·S·S Free-Cutting Carilloy FC is available in bar form, *either* quenched and tempered or annealed, in all sizes of rounds from ¼" to 8¼" diameter.

This is not a new, untested steel. The ability of Carilloy FC to boost production and to cut costs by making it less difficult to machine steels of high strength levels has been amply demonstrated in some of the country's largest shops.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

CARNEGIE-ILLINOIS STEEL CORPORATION
Room 2145 Carnegie Bldg., Pittsburgh 30, Pa.

Please have a representative call to discuss U·S·S Free-Cutting Carilloy FC.

Name.....

Company.....

Address.....

City.....Zone.....State.....

USS

UNITED STATES STEEL

Fuller Torque Converter

(*Continued from page 43*)

reaching to the extremity of the unit and mounting an over-running clutch (4) at its end. The clutch serves to lock up the stator automatically during periods of torque multiplication and release it at the clutch point.

The oil cooler chamber (5) is contained in the cast iron body having an aluminum cover (6) which serves as a means of rapid heat transfer for air cooling. To facilitate heat transfer, cover (6) has a large number of integral fins. In addition, there is a pressed steel baffle (7) so arranged as to force all cooling air drawn by the vanes on the outer surface of pump (1) to pass over the finned surface (6). Cooling air is drawn into this space through peripheral slots between (7) and the flywheel housing.

Finally, it may be noted that the converter-coupling unit itself is contained within a pressed steel housing (8) to which are riveted a flange carrying the inboard bearing, and a flexible steel spider (9) which serves to attach the assembly to the flywheel. Function of the flexible spider is to take up any possible misalignment in the entire mounting and thus relieve bearings of unnecessary loading.

No special comment is needed on the operation of the converter-coupling unit, since it is of the familiar three-element type. The stator runner comes into play during starting and acceleration when torque multiplication is required, then free wheels with the two main elements when the unit functions as a fluid coupling. Torque multiplication is of the order of 2.2 to 1.

The oil cooler arrangement is quite unique in the present state of the art. As mentioned earlier, no pressure pump is required with this system, the pressure required for operating the torque converter being obtained simply from the expansion of fluid in the closed circuit.

For all practical purposes the functioning of the cooling system is self regulating. It has been found that oil cooling is necessary only during the converter phase of torque multiplication. Under this condition, the stator is stationary and there is a difference in pressure in the fluid in the stator and pump exit. This creates a pressure forcing oil out of the converter through the drilled passages (10) in the hub of the stator and into the cooler through the annulus and passage (13) in the housing at the extreme right. Oil returns to the converter through the passages (11). Thus there is continuous circulation of fluid in and out of the converter during torque multiplication.

When operating as a fluid coupling there is no demand for oil cooling and actually little or no circulation takes place, under pressure, since the pressure within the converter is balanced when the stator is free-wheeling.

In the arrangement shown in Fig. 1, the self-contained converter unit is attached directly to a special transmission having an offset output shaft. This is a simple mechanically shifted gearbox having two forward speeds—high and low range, and reverse. The shift is selected by the driver in accordance with operating conditions but usually the lever will be in the high range.

Since there is no mechanical clutch in the circuit and since the transmission has no synchronizers, special means are required for effecting shifts either forward or reverse. This has been solved in an interesting fashion. At the outer end of the tailshaft extension is mounted an external brake drum (12) to which is applied a brake actuating mechanism. This mechanism can be one of several types, one suggested arrangement being a booster cylinder with a push button control on the shift lever to actuate a solenoid control valve which will provide practically effortless control. In any event

(*Turn to page 78, please*)

Follow the lead of these manufacturers who

Specify FRAM*

*Allis-Chalmers Mfg. Co.
*American LaFrance Foamite Corp.
*B. F. Avery & Sons Company
*Brockway Motor Company
*Buda Company
*Chicago Pneumatic Co.
*Clark Equipment Company
*Continental Motors Corp.
*Cooper-Bessemer Co.
*Crosley Motors, Inc.
*DeLaval Separator Co.
*Detroit Tractor Co.
*Diamond T Motor Car Co.
*Divco Corp.
*Euclid Road Machinery Co.
*Fate-Root-Heath Co.
*Harry Ferguson, Inc.
*Ford Motor Co.
*Ford Tractor Division
*Four Wheel Drive Co.
*General Motors Truck & Coach Div.
*Hercules Motors Corp.
*Hill Diesel Engine Co.
*Hobart Bros. Co.
*Frank G. Hough Co.
*Hudson Motor Car Co.
*Hyster Company
*Insley Mfg. Co.
*International Diesel Electric Co.
*Kermath Mfg. Co.
*Landis Tool Co.
*Lathrop Engine Works
*Leader Tractor Co.
*Lincoln Electric Co.
*Lincoln-Mercury Div. of Ford
*Mack Mfg. Co.
*McKay Machine Co.
*Meriam Instrument Co.
*National Supply Co.
*Nordberg Mfg. Co.
*Oliver Corp.
*D. W. Onan & Sons
*Owens Yacht Co.
*Reo Motors
*Schramm, Inc.
*Scripps Motors, Inc.
*Seagrave Corp.
*R. H. Sheppard Co., Inc.
*Star Marine Engine Works
*Studebaker Corp.
*Tropic-Aire, Inc.
*Universal Motors Corp.
*U. S. Thermo Control Co.
*Waukesha Motor Co.
*Willys-Overland Motors
*Witte Engine Works

*Prominent manufacturers listed at left equip some or all of their vehicles with filters embodying the Fram Principle of Oil Filtration.

Investigate Fram Oil & Motor Cleaners

Protect your engines with this same proven method . . . Fram Oil Filtration. Let us show you how Fram Oil Filters, engineered for your specific problems, can add life and cut maintenance on the engines you manufacture. Write for complete details and technical data. FRAM CORPORATION, Providence 16, R. I. *In Canada:* J. C. Adams Co., Ltd., Toronto, Ontario.

the function of the brake is to stop the entire tailshaft assembly including the converter-coupling at the moment a shift is to be made, permitting at the same time a slight rocking movement of the shaft so as to facilitate engagement of gear teeth.

Alloy Steels for Gears

(*Continued from page 37*)

187 to 207 BHN. The problem in the annealing of transmission gears is to obtain a structure that will give the best results for the varied machining operations used. Hardness is increased for parts where critical broaching operations are involved, thus decreasing somewhat machinability for turning and hobbing operations.

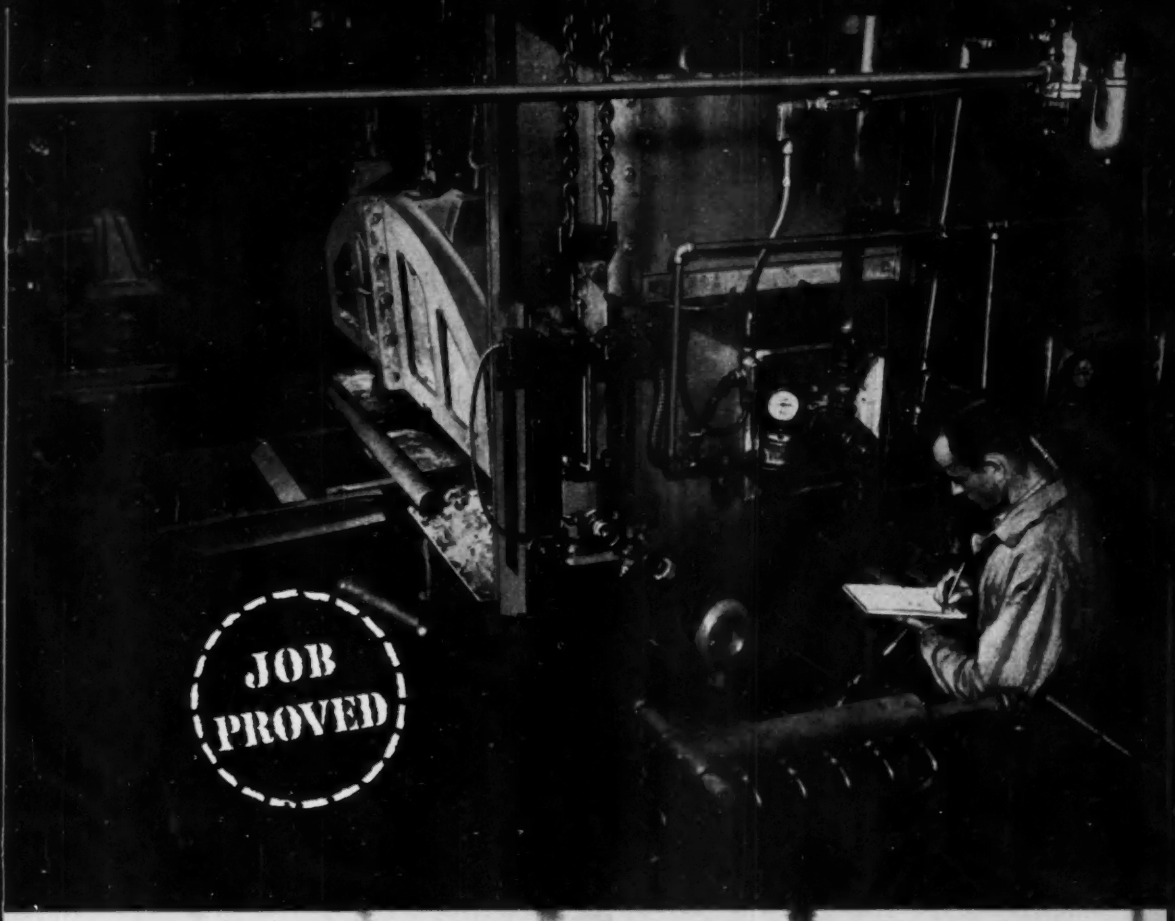
In order to secure greater economy in the production of conventional transmission gears, a steel of greater machinability would provide increased tool life and perhaps an increase in production rate. It is not easy to make a change, however, on tool life alone, because of the difficulty of getting records which will justify any increased cost for a material of greater machinability.

To maintain the necessary uniformity on counter and low speed gears, pilot lots are run on each heat of steel to determine if shaving rack settings must be changed to allow for any difference in distortion that may exist in heat treating. Gears are carbonitrided in continuous furnaces to a case depth of 0.005 to 0.010 in. with the practice being to hold case depth to the high side. The ammonia addition to the atmosphere represents approximately 1½ per cent of the total.

When continuous gas carburizing furnaces were first used, ammonia was not included in the atmosphere, and with the first use of ammonia, difficulty with erratic case hardness resulted. This ammonia addition amounted to approximately ½ per cent of the atmosphere. It was found later that to reduce the tendency toward tooth pitting, either a greater case depth or more of a carbonitriding effect was necessary. It was decided to leave the case depth unchanged and add ammonia up to 1½ per cent of the atmosphere. This move added to the cost of ammonia but saved the cost of additional equipment that would have been necessary to produce a greater case depth.

The quenching of transmission gears offers the best opportunity for decreasing the cost of operation. Hot quenching will improve control of dimensions and should reduce the amount of straightening necessary.

The foregoing article is an extract from the paper, "Economics of Automotive Gear Steels and Their Heat Treatment," which was presented by the authors at the recent SAE Summer Meeting held in French Lick, Ind.



HYDRAULIC SYSTEM KEPT LIKE NEW

Sunvis 916 Effects Substantial Savings; Strainers and Lines Kept Sludge-Free

A copper tubing manufacturer uses an oven with hydraulically operated doors to heat billets to approximately 1550F. The ambient temperatures around the hydraulic mechanism are abnormally high, putting the hydraulic fluid to a severe test of stability. Failure of the system would halt the piercing operation and result in costly delays throughout the plant.

Since the oven was first put in operation, three years ago, the hydraulic fluid has been Sunvis 916. The original charge has never been changed and is still in excellent condition, though the system is tight and requires only a minimum of make-up. Oil lines and strainers are completely free of sludge. Seals and packings are sound. Operations are never interrupted for oil changes or parts maintenance. The company expects to retain the original charge of Sunvis 916 in service indefinitely, effecting large savings in both oil and maintenance costs.

Sunvis 916 is a solvent-refined oil of the highest quality. It is fortified to resist the oxidation and sludging so detrimental to the efficient operation of hydraulic systems. Sunvis 900 Oils are *good for the life of your machines*. For your copy of the illustrated booklet "Sunvis 900 Oils" write Department AA 7.

SUN OIL COMPANY · *Philadelphia 3, Pa.*
In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO


Fir the foot to

the Shoe... or the Shoe to the Foot?

In friction materials, R/M can always fit the product to the need . . . because R/M makes 'em all!

When you entrust your brake and clutch problems to R/M, there's no chance of getting a "misfit" material. R/M, the largest producer in this field, makes every known type of friction material . . . and is constantly developing new types for new and different applications. Thus your R/M representative has no axe to grind for any one kind of material. Whatever your needs, he can recommend the right friction product . . . and he can call on the productive capacity of four great plants to make deliveries that suit your schedule.

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION **620 Fisher Bldg., Detroit 2, Mich.**

445 Lake Shore Drive, Chicago 11, Ill.

4651 Pacific Blvd., Los Angeles 11, Calif.

1071 Union Commerce Bldg., Cleveland 14, Ohio

Factories: Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings Fan Belts • Radiator Hose • Mechanical Rubber Products • Rubber Covered Equipment • Packings Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

RM

FIRST IN FRICTION

Turbojet *versus* Turboprop

ENGINEERS at the recent SAE National Aeronautic Spring Meeting in New York heard many timely papers which were presented at the well-attended technical sessions. Naturally with the advent of turboprop and turbojet powered commercial aircraft, a number of the papers discussed the merits of each type for possible commercial applications. The meeting, however, was not entirely devoted to gas turbines since papers were presented on other subjects such as aerial photography, standardization of powerplant utility parts, an investigation of reversing propeller pitch, and a flight simulator. The following two extracts are from papers concerned with the problem of which engine for air transport—turboprop or turbojet.

The Case for the Turbojet

by **Winnett Boyd**, Asst. Chief Engineer and Chief Designer, A. V. Roe, Canada, Ltd.

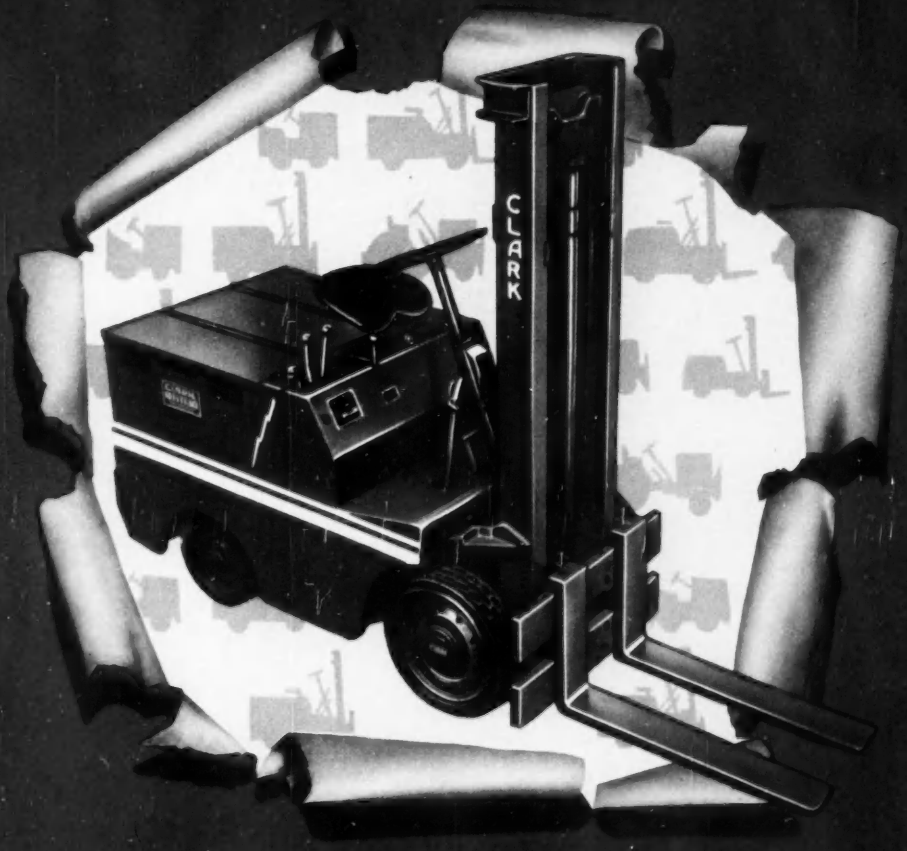
TURBOPROP transports can undoubtedly fly economically in the 400 to 500 mph cruising speed category and thus will be competing directly with the turbojet transport. Furthermore, they are quiet and vibration free so the jet cannot claim an advantage in this respect. However, in considering the position of the turboprop in this speed range, the time element must not be forgotten since the discussion centers primarily around the advances and developments of the next 5½ years. Although two turboprop transports are now flying, they are both short to medium range aircraft and have maximum cruising speeds of only 305 to 315 mph. This is somewhat better than existing piston-engined aircraft but is hardly enough to make them really catch the eye of the public.

The public wants speed with safety and comfort, and is willing to pay a premium for it as illustrated by streamlined trains and luxury ocean liners, and the fact that the jet idea has caught the public fancy. This is extremely important since it means that turbojet transports could be introduced today on premium fare runs and would be an immediate commercial success. Besides this, there is another very important parallel between the turbojet transport and the streamlined Diesel train. That is, the latter was introduced as a premium fare passenger train but proved so economical to operate that Diesels are now being used for quite a number of non-premium runs, and even for hauling freight. Indeed, because of the great economy of Diesels or conversely, their greater net earning capacity, some railroads are finding it advantageous to scrap existing steam equipment, even though it is only partially worn out, and replace it with Diesels. Likewise, turbojet transports will undoubtedly be first adopted for premium fare runs but will soon demonstrate their economy and will subsequently displace their slower turboprop and piston-engined rivals on a large majority of the "bread and butter" runs. As in the case of the railroads, this process of replacement may necessitate the premature retiring of existing aircraft, replacing them by turbojets, simply because it is the most economical thing to do. It is difficult to appreciate the reticence of the airlines towards turbojets since the first one that adopts them will force the pace for the others, and after they have all taken the plunge they will find con-

(*Turn to page 85, please*)

A sound record !

THE HUGE SAVINGS EFFECTED BY CLARK FORK TRUCKS FOR EVERY INDUSTRY IN WHICH MATERIALS ARE HANDLED

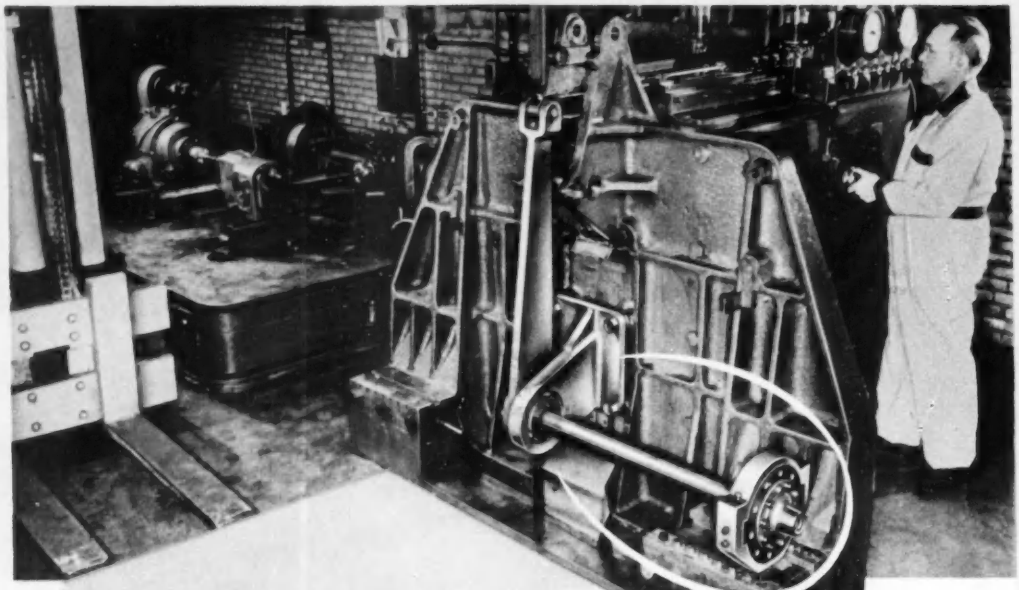


CLARK ELECTRIC AND GAS POWERED FORK-LIFT TRUCKS AND INDUSTRIAL TOWING TRACTORS

TURN PAGE FOR OTHER CLARK PRODUCTS

CLARK EQUIPMENT COMPANY, Buchanan, Michigan

Other Plants: BATTLE CREEK AND JACKSON, MICHIGAN



"Lifetime-Test"

—PROVES CLARK TRUCKS "BEST"

HERE YOU SEE an axle shaft being "fatigue" tested. A twisting force much greater than that which the shaft must withstand in actual operation is alternately applied, then relieved—on, off, on, off, to determine how much punishment the shaft will take. It's all part of the Clark program to build equipment with added strength and an ample factor of safety.

CLARK ENGINEERING has created fork-lift trucks with the fixed purpose to build "the best." In Clark's Engineering Laboratory—the only one of its kind in the entire field of materials handling—Clark Products are put through tests comparable to a lifetime of operating service.

THE RESULT is just what you expect from Clark—machines and parts that serve you well and economically by doing *more work*, at lower operating costs, and for a longer time.

MORE REASONS **WHY**
CLARK FORK-LIFT TRUCKS
ARE YOUR **"BEST BUY"**

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**
AND INDUSTRIAL **TOWING TRACTORS**

INDUSTRIAL TRUCK DIV., **CLARK EQUIPMENT COMPANY** BATTLE CREEK 6B, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

PRODUCTS OF CLARK — TRANSMISSIONS FORK TRUCKS & TRACTORS AXLE HOUSINGS
GEARS AND FORGINGS RAILWAY CAR TRUCKS ELECTRIC STEEL CASTINGS
FRONT AND REAR AXLES FOR TRUCKS AND BUSSES METAL SPOKE WHEELS TRACTOR UNITS

siderably greater earnings on their investment. Along this line it might be mentioned that a Canadian airline has already ordered two long range turbojet transports which are scheduled for delivery in 1952 and should be in service in 1953.

All of the above arguments do not deal with the detailed technical advantages of the turbojet transport over its rivals, but they are important. I am inclined to think that they may not have been given sufficient emphasis in the past. However, the turbojet transport will have to be a solid money making proposition despite all its attractions for the public if it is going to be adopted. Besdes this, it will have to be at least as safe as existing airplanes.

The Case for the Turboprop Engine

by **R. M. Hazen**, Director of Engineering, Allison Div., General Motors Corp.

TURBOPROP powered commercial airplanes in this country for 1955 will give better take-off conditions and lower cruise fuel consumptions than any other turbine type engine, therefore allowing the smallest airplane for a given payload and distance. They will give the most economical fuel costs at least to 500 mph and, with foreseeable propeller development, probably well beyond. Having excellent characteristics for off-optimum schedule conditions, they are adaptable to a wide variety of commercial uses.

Availability of turboprop engines is better than any of the proposed more efficient turbojets, excepting, of course, current, low-compression ratio fixed nozzle types which are very wasteful of fuel. Future efficiency and economy improvements with additional research and development will give greater dividends on the turboprop engine than on the turbojet. Presently available turboprop engines can be applied to existing American transports with performance and economy improvements, along with the smoothness, lower fuel cost, and easier inspection and maintenance common to all turbines.

There are many reasons besides the technical and economic which influence the selection and use of aircraft power plants. We are engaged in both turbojet and turboprop engine development and manufacture and have no reason to promote one as against the other. However, considering the availability of useful sizes, the technical and economic advantages and the greater flexibility in use of the turboprop engine, it appears reasonable to expect that in such commercial "whooshing" as is done in 1955 the turboprop engine can and should play an important part.

Detroit Gear Promotes Sickelsteel to V. P.

David L. Sickelsteel has been promoted from chief engineer of Detroit Gear Div. of Borg-Warner Corp. to vice president in charge of engineering.

Replacement Program

(*Continued from page 33*)

At the outset the technicians were instructed to undertake a survey of all machine tools and related production equipment, in order of age, beginning with the oldest on the books. They were assigned first the task of developing detail reports on the advantages of modern equipment over old machinery. Incident to this, lists were prepared of the basic features of machines to be studied. Eventually these basic criteria were developed into work sheet forms or survey data sheets—one form for metal cutting machinery, the other for power presses. These forms are reproduced here for examination.

Supplementing the work sheets is a card record to which information in condensed form is transferred for permanent filing and ready reference. These cards, Fig. 3, enable study by top executives in convenient fashion for subsequent programming. The two sides of the card are used to present a before-and-after record of each item.

In the opinion of the Ford management the most important outgrowth of preliminary surveys was the establishment of a definite rating procedure, resulting in a classification according to usage as follows:

Class 1—Service machines—on operations on past model parts.

Class 2—Machines with little use—standby or special setup for small lots.

Class 3—Machine replacements already planned—by Process Section.

Class 4—Machines on non-productive uses—in other than production departments.

Class 5—Machines affected by new model designs—known major changes coming.

Class 6—Machines on non-standard uses—small mill mounting a wire brush, etc.

Class 7—Direct replacement possibilities—new machine for old.

Class 8—Operation combination possibilities—two operations on one part.

Class 9—Process study required—more than two operations affected.

Class 10—Satisfactory operations.

All machine studies, as they are completed, are given a suitable classification so that first attention may be given to those having the best prospect of immediate results. Generally speaking, Classes 6, 7, 8 and 9 are those given first attention by the management.

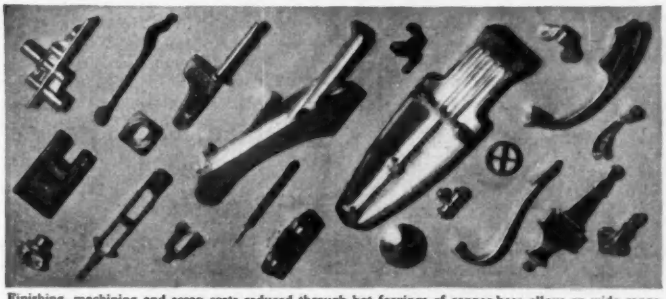
Under the watchful eye of management, the replacement program has resulted in several project requests for funds. Some approvals were given by the end of 1949 and some have developed this year. In fact, a considerable number of new items of equipment were ordered immediately following approval and some new machines already are installed and operating.

The formal program has expanded in other directions and is developing interesting ground rules. For example, in some instances items of equipment formerly on regular production have been relocated to replace older machines formerly making service parts. This has resulted in an improvement in service operations and at the same time has permitted the scrapping or salvage of older service machines.

In certain specific instances, such as centerless grinders for example, an entire battery of older machines has been replaced with modern models capable of serving a number of years without obsolescence.

Generally speaking, in the face of major equipment programs incident to design changes, the turnover of old equipment—in this plant—is being approached on a conservative basis. The most urgent cases are tackled first and an effort is made to spend the

(*Turn to page 88, please*)



Finishing, machining and scrap costs reduced through hot forgings of copper-base alloys on wide range of parts—Courtesy Brass Forgings Company, Ferndale, Mich.

Hot Forgings Reduce Machining, Finishing Costs of Brass Parts

Cost and quality-conscious manufacturers are turning more than ever to hot forging of copper-base alloys as a means of eliminating machining of intricate shapes and materially reducing expensive polishing and buffing procedures.

Not only is the forged surface smoother than that of a sand casting, but the part is free from porosity and has greater strength, toughness and resistance to wear and fatigue. Rejections through porous or faulty castings are also eliminated by forgings.

The closer tolerances which can be held in forging may in many instances eliminate machining of clearances and non-precision dimensions.

Wide Range of Products

The illustrated hot forgings, produced by Brass Forgings Co., Ferndale, Mich., show a wide range of applications—refrigeration and builders' hardware; automotive, welding, and blow torch equipment; surgical instruments; SAE fittings; navigational instruments, machine gun parts, and wing nuts.

In the majority of these parts, corrosion from the atmosphere, moisture and other media must be withstood, and moderate strength is desired. For these reasons, as well as for color in decorative items, brass has been selected.

The standard forging alloy, which answers normal demands in corrosion resistance, wear, toughness and strength, as well as excellent forging characteristics, contains approximately 60% copper, 1.75% lead, 0.2% tin, and the remainder zinc. The lead content makes this alloy exceptionally good for machining. It has a tensile strength of 60,000 psi in the forged condition and a Rockwell hardness of B52.

Duronze III For Strength

In cases where greater strength, wear resistance and hardness are essential, silicon aluminum bronze, (Duronze III), 91% copper, 7% aluminum and 2% silicon, is suggested. This bronze has a tensile strength of 85,000 psi, a Rockwell hardness of B85 and a yield strength of 45,000 psi as compared to brass and silicon bronze forgings averaging about 25,000 psi.

Silicon aluminum bronze is about 10% lighter than silicon bronze and forges at a temperature between 700 and 800 degrees centigrade. Despite its high strength and hardness it is very plastic at forging temperatures. It also has a very high resistance to corrosion in comparison to the normal forging alloys.

Other Forging Alloys

Silicon bronze with 97% copper and 3% silicon is stronger and tougher than copper. It resists weathering and is used for outdoor and electrical hardware, large bolts, screw products, marine hardware and sewage disposal equipment.

Naval brass is widely used for marine hardware for its resistance to corrosion from sea water. It contains about 60% copper, 0.75% tin and the remainder zinc. Due to the absence of lead, machinability is reduced. The machinability of this alloy can be increased through the addition of one or two per cent lead.

Manganese Bronze – Contains approximately 58.5% copper, 1% iron, 0.3% manganese and remainder zinc. Used for valve parts, and for parts where greater strength than brass is needed.

Muntz Metal—Forges readily, but is not free machining. Contains 60% copper and 40% zinc. Used for miscellaneous work such as large bolts and nuts. Does not resist corrosion as well as other alloys under certain conditions.

Bridgeport's Laboratory will supply further information on the characteristics of various forging alloys and help engineers select the correct alloy for specific uses. Call our nearest district office or write Bridgeport.

Bulletin Reprints Available

Reprints of the Copper Alloy Bulletin are available to those of you who want to build up a reference set. Also available is a limited number of back issues for those who do not have a complete set.

Make sure you receive the Bulletin by mail. *Write:* Editor of Copper Alloy Bulletin, Bridgeport Brass Company, Bridgeport 2, Conn.

money on selected items of different types of machines rather than to clean up a single type of machine, such as a drill press or lathe, across the board. By this means sizeable yearly replacements are bound to reduce the backlog of old machines over a period of time.

We cite the foregoing as an outstanding example of management progressiveness. It takes good thinking and leadership to recognize the problem of old equipment and the drag of its inertia upon the economy of the entire operation. It takes still more to sell top management on the wisdom of uncovering the profit wasters and doing something tangible about it.

Alfa Romeo Has More Powerful Engine

Milan, Italy.

Series Three of the Model 6C is to constitute the main line of Alfa Romeo passenger cars for the present season. Its six cylinder engine of 152 cu in. piston displacement has two chain-driven overhead camshafts, operating directly on the valves, and develops 105 hp at 4800 rpm. Clutch and transmission housings, oil pan, and cylinder head are light alloy. The cylinder block is an iron casting.

Series Three features independent suspension all round, with trailing arms and coil springs in front, and longitudinal torsion bars at the rear. Speed claims are 90 to 100 mph according to the type of body fitted.

Late this year Alfa Romeo will place on the market a lower priced model with a four cylinder engine of 115 cu in. piston displacement, having the same valve layout with double camshafts as the Series Three engine and developing 92 hp. Suspension will comprise coil springs at the front and a rigid axle with coil springs, radius arms and a Panhard V-anchorage at the rear. Integral frame-body all steel construction will be adopted.

Unusual Boring Machine Setups for Ultramatic Parts

(*Continued from page* 45)

hardening is to polish the ball race. Not only is surface finish held to close limits but the surface must be absolutely free from marks or scratches.

Cutting of the ball race to form and with the required surface finish is done by means of tools held in cam-operated tool holders which are seen directly in front of the two work stations. The operation is automatic save for loading and unloading.

Mexican Automobile Industry

By the way, the Mexicans' taste in automobiles runs parallel to ours. They, too, prefer the large shiny U. S. designed car to the smaller European model.

Latest available figures show nearly 300,000 motor vehicles registered in Mexico:

Total Registration	(approximate)	Percentage in Mexico City
Passenger cars (including 5000 taxis)	173,000	30
Trucks	105,000	12
Buses	18,000	23

Using the customary 10 per cent to estimate annual obsolescence of vehicles in use, the country would require about 25,000 to 30,000 units every year, just for replacement. Of course, this does not take into consideration the increasing market for motor vehicles in this fast growing nation. Present government restrictions permit the assembly of only about 50 per cent of the minimum requirement.

It is safe to estimate that about 14,000 persons, workers and their families, depend economically on the automobile assembly industry. Total salaries and wages paid by the industry amount to $2,543,200 yearly, the average wage being comparable to the highest wages in Mexico.

Despite its present restricted operations, the industry spends $19,385,195 a year in Mexico, distributed as follows:

	Amount	Percentage
Production expenses	$2,962,018.80	15.28
Administrative expenses	1,020,863.60	5.27
Sales expenses	673,023.20	3.47
Financing costs	77,914.40	.40
Prime materials	5,798,264.80	29.93
Wages and salaries	2,545,280.80	13.13
Total taxes	5,668,792.80	29.24
Social security (medical plan)	128,662.80	.66
Social welfare	78,839.20	.41
Fuel	64,504.80	.32
Publicity expenses	367,030.00	1.89
	$19,385,195.20	100.00%

The industry's impact on the Mexican economy is tremendous. As in the United States, its growth promoted the growth of allied industries, themselves becoming major enterprises. The scope of the automotive and allied industries is shown in the following 1949 table of capital investment and number of employees. These figures do not include the petroleum industry with a capital investment of $79,359,400 and 28,500 employees.

	Capital Investment	Jobs
Assembly plants	$29,362,000	3,000
Tire & tube manufacturing*	5,780,000	4,500
Passenger bus operations** (excluding school buses)	29,478,000	42,500
Freight trucks (public service only, excluding industrial & commercial)	19,652,000	20,000
Automobile dealers	57,800,000	4,800
Taxis	13,872,000	12,500
Gasoline dealers	12,485,000	10,000
Repair shops, garages, tire dealers, etc.	9,248,000	12,000
	$177,677,000	109,300

*—670,000 tires; 470,000 tubes.
**—8,500 passenger buses.

In addition to the above, a beginning has been made in the manufacture of batteries, springs for trucks, commercial bodies and bus bodies.

The automobile assembly industry, while concerned very much with the present, looks ahead to the future. It maintains an educational program for its workers and dealer personnel. By means of scholarships and service schools more and more Mexicans are gaining experience and learning the techniques of automobile manufacture, assembly, and servicing.

(*Turn to page* 94, *please*)

In these and more of the nation's great pleasure, commercial and "work-horse" vehicles the Aetna Clutch Release Bearing is standard equipment. No guarantee we might write could carry more significance than that fact, no greater proof of this bearing's ability to serve faithfully and faultlessly in your mobile vehicles too.

Aetna T-TYPE Clutch Release BEARINGS

WITH THE... T ...THAT TAMES TROUBLE

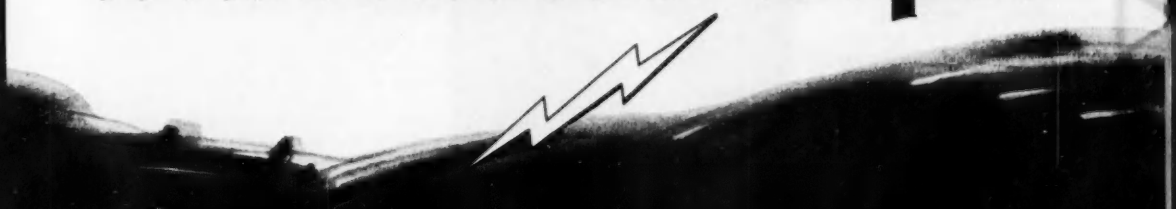
AETNA BALL AND ROLLER BEARING COMPANY
4600 Schubert Avenue • Chicago 39, Illinois

Here it is . . .

Safe: HIGH STARTING TORQUE, to ride through ice and snow. POSITIVE OPERATION . . . always ready with constant power when passing or climbing hills.

Sensible: NEW LOWER COST, MORE COMPACT DESIGN, with only *one* gear reduction unit.
DESIGN IS FLEXIBLE to meet car manufacturers requirements.

Safe, Sensible, Dependable Electric Windshield Wiper



Redmond

SAFE-R-WIPE

REDMOND

Dependable: UNUSUALLY QUIET HIGH POWER SOURCE . . . the famous Redmond Micromotor.
EXTRA LONG LIFE with silent reduction gear of new design.

SAFE-R-WIPE is built only by REDMOND . . . *the BIG name in Small Motors*

REDMOND COMPANY, INC., OWOSSO, MICHIGAN, U.S.A.

The belief held in some quarters in the U. S. that the Mexican is mechanically inept is simply not true according to production managers in the industry. The unskilled workers prove eager and extremely teachable. They take to tools like ducks to water and become first class craftsmen. Labor is unionized and the plants operate as closed shops. Labor - management relations are reported to be excellent.

Recently, this writer covered the Mexican six-day, 2178 mile stock car race from Jaurez, opposite El Paso, Texas, to El Ocotal, a tiny Mexican village on the Guatemalan border. Among other things, the event served to publicize the fact that there are other first class highways in Mexico than the well-known Pan-American Highway out of Laredo, Texas.

Actually, the recent rate of growth of the entire highway system is phenomenal. To obtain first hand information, the writer went direct to home plate. Mr. Augustín García López, Secretary of Communications and Public Works, a member of President Alemán's cabinet, said, in an interview, that the country now has 13,948 miles of all weather highways including 8140 miles which are paved. By the end of the present administration, in 1952, the all weather highways will total 17,335 miles, of which 9472 miles will be paved.

To supplement the government program, a newly formed group — part public, part private — will build each year for the next 10 years 621 miles of farm-to-market roads. The recently established National Rural Roads Committee is financed by contributions from the automotive and tire industries in amounts equal to 10 per cent of their production taxes. The federal government matches this amount and brings the committee's total annual fund to about $1,618,400 for the construction of feeder roads.

And why all this great activity and enormous expenditure? The administration has already witnessed how the opening of new highways has stimulated large investments from private sources in increasing the industrial, mining and agricultural activity of the nation, thus creating thousands of new jobs at good salaries, increasing the purchasing power of the people and the nation.

Acknowledgment:

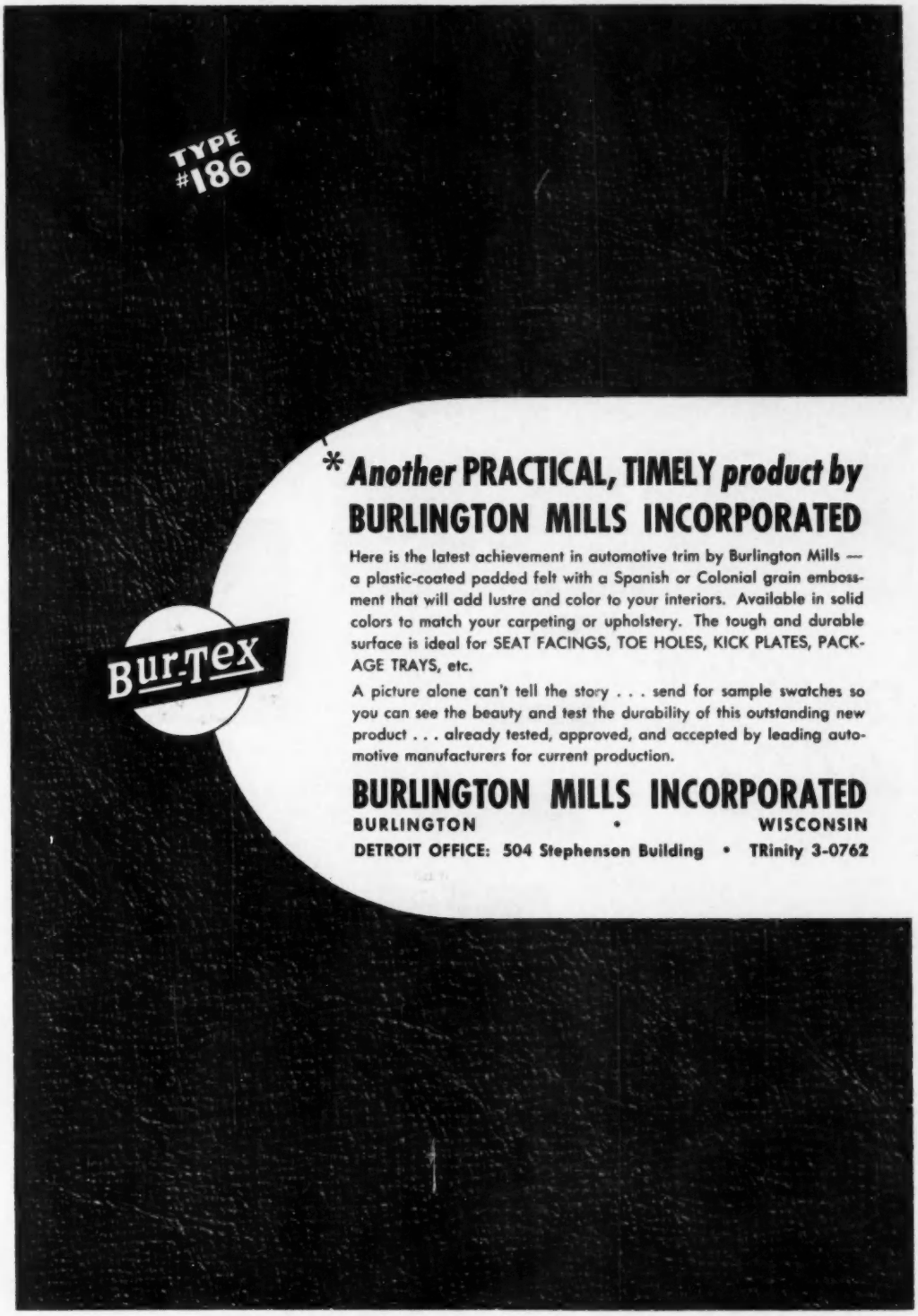
The author acknowledges the generous cooperation of the following in supplying information contained in this article:

Jose J. March, Asociacion Mexicana de la Industria Automotrix and Asociacion Mexicana de Caminos.

Andres J. du Bouchet del Rey, General Motors de Mexico.

Henri G. Paasch, Chairman, Asociacion Mexicana de la Industria Automotriz, and Director, Chrysler Corp. of Mexico.

Manuel E. Razo, Manager, Asociacion Nacional de Distribuidores de Automoviles.



* *Another* PRACTICAL, TIMELY *product by* BURLINGTON MILLS INCORPORATED

Here is the latest achievement in automotive trim by Burlington Mills — a plastic-coated padded felt with a Spanish or Colonial grain embossment that will add lustre and color to your interiors. Available in solid colors to match your carpeting or upholstery. The tough and durable surface is ideal for SEAT FACINGS, TOE HOLES, KICK PLATES, PACKAGE TRAYS, etc.

A picture alone can't tell the story . . . send for sample swatches so you can see the beauty and test the durability of this outstanding new product . . . already tested, approved, and accepted by leading automotive manufacturers for current production.

BURLINGTON MILLS INCORPORATED

BURLINGTON • WISCONSIN

DETROIT OFFICE: 504 Stephenson Building • TRinity 3-0762

NEW PRODUCTS

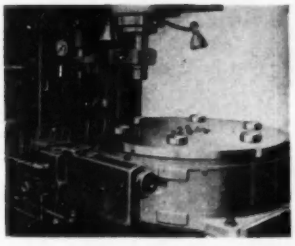
For additional information regarding any of these items, please use coupon on page 54

(*Continued from page* 64)
than regular "smoked sheet" rubber, the processing of this extra-quality type is said to remove all impurities, leaving it dirt-free and easier to handle in manufacturing operations. Its light color and cleanliness are stated to make it advantageous for such products as white sidewalls for tires, transparent tubing, etc.

P-20—Automatic Index Table

The Denison Engineering Co., Columbus, Ohio, is now making a 33 in. automatic index table (with 24 in. work-circle) that can be used on either their 35-ton Multipress or other makes of equipment. Hydraulically powered, it provides variable speeds for any preselected indexing rate from 10 to 70 indexes per min, and positions the dial with an accuracy of plus or minus 0.002 in. When installed on the Multipress, it is powered by the pumping unit of the press through the control system of the press. The table can also be operated by a small auxiliary pumping unit when used with other than hydraulic equipment.

A completely self-contained accessory, the table is available in 6 and 12 station types. It operates from, and in positive sequence with, the action of the press ram through the control system of the hydraulic power unit. This provides positive interlock. The ram cannot descend while the table is



Denison large hydraulic index table

in motion, and the table will not rotate until the ram has completed its cycle.

A feature is a positive locking device that holds the dial firmly in place at each station. The connecting linkage between driver and locking mechanism releases the locking pin as the table prepares to rotate through each cycle. The dial is rotated and indexed by a Geneva arbor drive mechanism. which is actuated by a variable speed Denison fluid motor, powered by the Multipress pumping unit. Speed, in a stepless range, can be changed while the table is in motion.

Operations can be made completely automatic by use of automatic hopper feeds and automatic ejection devices, mechanical brush-off, push-out, or punch-through, and air pressure, with air valves actuated by downstroke of the press ram. A cam track can be provided under the table dial, permitting various cam arrangements for automatic ejection of parts, or for raising or lowering ejection tooling.

A built-in "skip-station" accessory is available, permitting hurdling from one to five stations without loss of time at each idle station.

(*Turn to page* 102, *please*)

AT SAME
DRAWING SPEED

Clearing *HiProDraw* Cycles in
5 Seconds

Conventional press requires
8½ seconds

Up to 70% Faster Production

This mechanical, double-acting press provides fast approach and return combined with reduced speed during actual draw. It will deliver up to 70% more pieces per hour without drawing any faster than an ordinary double-action press. Write for full details about the new

CLEARING HiProDraw

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS

again . . . Morse is first!

ROLLER CHAIN AND PARTS

New convenience, handling headaches eliminated, time saved! These are just a few of the benefits you get with the new Morse packages.

A quick glance at the neat label tells you the contents of any package. And, at all times, you are sure of roller chain or parts that are clean, dust-free, easy to handle, ready for immediate assembly.

ALL THESE ADVANTAGES ARE YOURS:

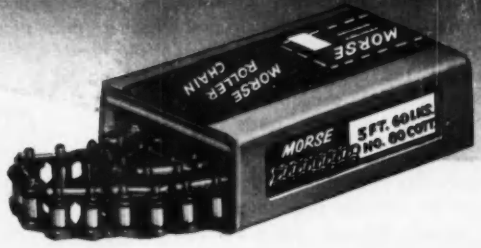
- ★ **Easy to store . . . on shelves or in bins . . . saves storage space . . . it's PACKAGED!**
- ★ **Simple to handle . . . no sorting through a maze of chains . . . no struggling with loose chain lengths . . . it's PACKAGED!**
- ★ **Quick identification . . . the label on the package identifies the contents at a glance, lets you select the correct package quickly, easily . . . it's PACKAGED!**
- ★ **Clean, dust-free chain and parts . . . dirt, dust, grit cannot get inside the tightly sealed boxes . . . it's PACKAGED!**
- ★ **Inventory time saved . . . packages are easily identified, rapidly counted . . . it's PACKAGED!**
- ★ **These popular chain lengths available. Up to 1" pitch chain packaged in 5' and 10' coils, 50' and 100' reels; 1" pitch packaged in 5' and 10' coils, 50' reels; over 1" pitch packaged in 10' coils.**

The complete Morse Roller Chain packaging program is another step forward to provide added convenience for Morse customers, and to help Morse Distributors give them even faster and better service . . . another reason why . . .

M=PT Morse *means* Power Transmission

THE OLD WAY

THE MORSE WAY



Write today for Folder F57-50, which gives a complete description of all Morse Factory-Packaged chains and parts, together with the list prices.

MORSE

MECHANICAL
POWER TRANSMISSION
PRODUCTS

PRODUCTS OF BW BORG-WARNER

Morse Chain Company, 7601 Central Ave., Detroit 8, Michigan

Observations

(*Continued from page* 56)

markable to find how easy it is to park the Cadillac or Buick in a tight spot. We gather that with reasonable production rates power steering might be sold as optional equipment around $65 tops.

More Juice

One of the round tables at the Summer Meeting indicated there is more to high compression engines than has met the eye. As compression goes up there is greater demand for electrical energy for firing particularly at high speeds. Moreover, it takes more power to crank such engines, hence the need for bigger batteries. Apparently the answer lies in the adoption of 12-v systems in the future. And that will bring with it some problems with lamps, radio, and distributor contacts as well.

On Semantics

One of the committee sessions at French Lick delved into the problem of standardizing torque converter nomenclature. There is enough variety of types and makes to make standardized nomenclature a must. But like all new projects of this kind, it will take some time to reach agreement.

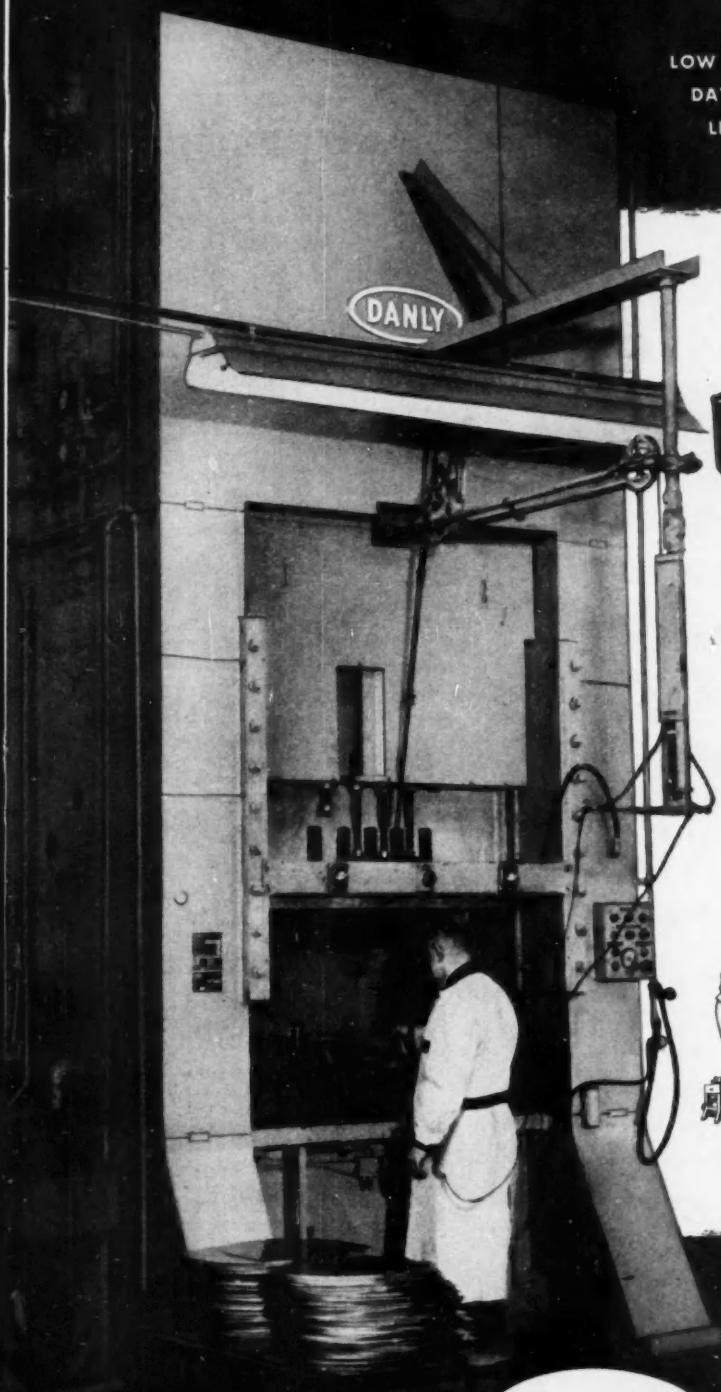
Vee Six

Rumor persists that one of the big car producers is grooming a V-6 for next year. Whether or not that is true, we have heard of an experimental V-6 said to give excellent performance. Lancia recently announced a V-6 engine but without comment as to need for special means of balancing. The engine we were told about has a balance bar running within the camshaft and driven off the front end at one to one.

Extruded Spider

An interesting slant on the advances being made in the art of press forging was afforded the writer recently. One of the important manufacturers of universal joints has placed in regular production a spider which is made by extrusion in a heavy forging press. This is claimed to be an outstanding accomplishment in the art.

FOR EASE OF MAINTENANCE,
LOW OPERATING COSTS AND DEPENDABLE
DAY IN AND DAY OUT PERFORMANCE,
LEADING MANUFACTURERS SPECIFY



DANLY PRESSES

... the key to stamping economy!

On mass-production lines and under exacting precision stamping requirements, Danly presses are establishing new performance records. Outstanding improvements in press engineering, design and construction assure longer uninterrupted production runs, increased die life and greater operating safety.

The new Danly clutch alone, designed to combat heat, major cause of press clutch wear, is proof of Danly press engineering leadership. Other outstanding features include complete pressure lubrication and a specially designed press control system. Write today for specific information on the advantages of Danly Presses in *your* plant.

Send for this new Danly Straight Side Press Catalog

*The 175 ton straight side DANLY press shown is located in the new A. B. Dick plant, manufacturers of mimeograph office equipment.

MECHANICAL PRESSES . . . 50 TO 3,000 TONS

DANLY MACHINE SPECIALTIES, INC. DANLY®

2100 SOUTH LARAMIE AVENUE, CHICAGO 50, ILLINOIS

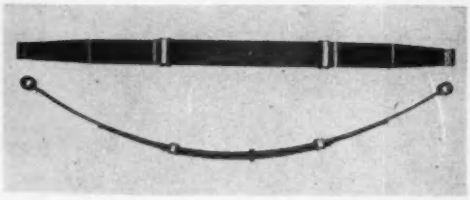
NEW PRODUCTS

For additional information please use coupon on page 54

(Continued from page 96)

P-21—Three Leaf Passenger Car Spring

The Spring Perch Co., Inc., Lackawanna, N. Y., is prepared to produce commercially its three-leaf "Broadbeam" semi-elliptic spring for passenger cars. Designed to supplant the conventional multiple-leaf springs now in use, the "Broadbeam" spring is declared to provide a more efficient utilization of steel and a weight saving up to 30 per cent for equivalent performance. The combination of lower production cost and weight reduction is said to result in a substantial cost saving to the passenger car builder.



Spring Perch Co.'s three-leaf "Broadbeam" semi-elliptic spring for passenger cars

Broadbeam springs are fabricated from all of the commonly used spring steels in widths ranging from 2¼ to 3½ in. as compared with conventional springs of 2-in. width. Because of uniform distribution of metal, together with the tapering thickness of the two short leaves, the new spring design effects a close approximation of a uniform beam, thus accounting for weight reduction.

The spring can be made interchangeable with the present spring—as to mounting at both ends—by tapering the width of the main leaf to a 2-in. width at the eye. The extra width at the center naturally requires a change in the pad mounting.

The extra width and strength of the spring are said to increase transverse stability in some cases as high as 50 per cent. Resistance of the 3-leaf spring to brake wind-up is said to be equal to that of conventional springs.

Among special properties of the spring is a guarantee against permanent set. It is made from flat steel stock which resists permanent set, supplemented by special process operations designed to prevent set. The uniform distribution of material, and a consequent elimination of stress concentration, aids in increasing fatigue life. In addition, fatigue life is greatly enhanced by precision shot peening.

The spring is fitted with special rebound clips.

Strapping and seal are of stainless steel, insulated from the leaves by a rubber channel. This arrangement permits freedom of movement of the leaves but prevents development of squeaks and rattles.

Control of inter-leaf friction is effected by use of a super tough rag paper liner impregnated with a special lubricating wax. The liners are said to resist wear and assure quiet operation.

P-22—Silver Cell Midget Battery

Produced by Yardney Electric Corp., New York, N. Y., is an addition to the

EATON

Fresh-Air Heating, Ventilating, and De-Frosting Systems Achieve a New High in Motor Car and Truck-Cab Comfort, Safety, and Driver Health

Manufactured in the country's largest, most modern plant devoted exclusively to automobile heater production. Engineered for, and sold exclusively to car and truck manufacturers.

EATON MANUFACTURING COMPANY

Heater Division

CLEVELAND, OHIO

EATON PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGTITES SPRING WASHERS • COLD-DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 54

Yardney Silvercel line of high-efficiency, low-volume batteries which consists of their Model No. A1-HR-1. Occupying less than 1 cubic in. in volume and being well under 1 ounce in weight, this midget battery is capable of a discharge rate of 5 amps up to 20 minutes, and can be discharged at rates up to 30 amps. In addition, it is completely free from corrosive fumes, vapors or spray.

The Yardney Silvercel is claimed the smallest and lightest rechargeable storage battery in the world—about one-third the size and one-fifth the weight of the conventional lead-acid and nickel-cadmium types. An alkaline storage battery, it utilizes silver and zinc as active materials and is produced in a variety of models ranging in capacity from one-half amp hr to forty amp hrs. Cells with an even higher capacity are in the pre-production stage. All are spillproof and a number are leakproof as well, while results of temperature, shock and altitude tests are said to be in keeping with the other amazing attributes of this "miracle midget" in the storage battery field.

The A1-HR-1 is shorter and narrower than a standard match book.

P-23—Heavy-Duty Fork Lift Truck

Service Motowlift, heavy-duty model fork lift truck

Broadening of the Service Motowlift line of fork lift trucks to include heavy-duty models of advance design in the 4000 lb and 6000 lb capacity class is announced by Service Caster & Truck Corp., Albion, Mich. Power plant is Ford 6-cylinder industrial engine of 226 cu in. displacement. A heavy-duty integral drive axle and constant mesh transmission by Timken is provided, together with a special Borg-Warner clutch that can be replaced in two hrs without removing engine or transmission.

Added to single lever control for lifting and tilting operations is a single lever automotive type gear shift driving feature.

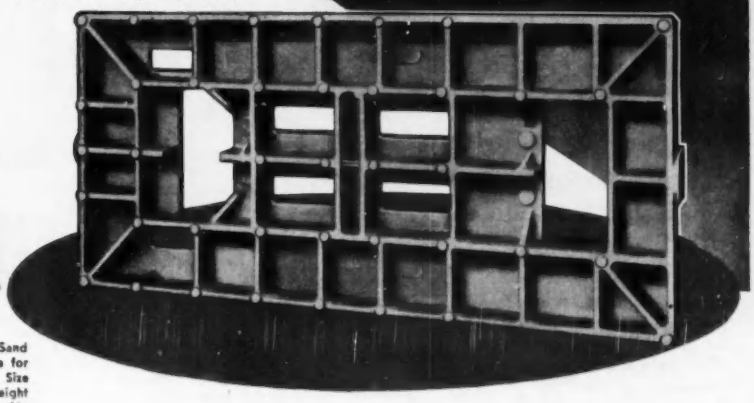
Mast channels are formed from ¾ in. steel. The carriage is equipped with eight hardened, anti-friction rollers. The two lifting chains have a strength of 24,000 lbs each. A variety of lifting heights is available. Other features include grouping of instruments and gages beneath the steering wheel for visibility; re-designed hydraulic system; improved frame design for maximum maneuverability; Ross steering; hydraulic brakes; and high pressure lubrication at all greasing points.

21,568 TIMES HEAVIER!

WEIGHT
1 OUNCE

Both Castings are ALUMINUM ...both by PERMITE

WEIGHT 1,348 LBS.



This giant Permite Aluminum Sand Casting is for use in a machine for making all-steel burial caskets. Size approximately 10'x5'x1'. Net weight 1,348 lbs. The tiny 1 oz. Permite Permanent Mold Aluminum Casting above is a hydraulic brake piston.

DEMONSTRATED versatility in size and type of aluminum castings produced is but one of the reasons why the Permite foundries are leaders in the production of aluminum castings by the permanent mold, semi-permanent mold, sand or die casting processes.

Permite offers the services of expert metallurgists to aid you in the selection of the alloy that will, at the lowest cost, best fit the needs and specifications of your particular casting problem.

If desired, Permite casting specialists are available to advise you on the changes in structural design that will increase strength and effect possible economies in metal and machining.

Whatever your requirements as to size or type of aluminum casting, forward blue-prints today for free recommendations and estimates.

ASK FOR *NEW* 80-PAGE CASTING MANUAL

Authoritative illustrated manual on the design, production and application of aluminum castings. Includes casting alloys tables. Sent free on request to interested executives.

PERMITE

ALUMINUM INDUSTRIES, INC.

CINCINNATI 25, OHIO

ALUMINUM PERMANENT MOLD, SAND and DIE CASTINGS...HARDENED, GROUND and FORGED STEEL PARTS

NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 54

(*Continued from page* 48)

the gears on a conveyor as they come off the previous operation. The conveyor carries them through the finishing operation and returns them to the operator for removal from the conveyor.

The arrangement is made possible by passing the conveyor right through the machine, instead of having it pass by the machine in the conventional manner. It involves merely an aperture in the rear of the column for the exit of the conveyor.

Cluster gears can pass—on the same conveyor—through a battery of 870 machines, each of which, in turn, finishes a specific gear in the cluster, the conveyor itself providing the automatic transfer from one machine to the next.

The conveyor is provided with simple spring loaded jaws to hold the gears. To hang a gear on the conveyor, light finger pressure on the top of the jaws opens them. The gear is inserted. Release of finger pressure closes the jaws. Finished gears are removed from the conveyor in the same manner, although automatic release from the conveyor is possible if handling automatically after removal avoids nicking of the gears.

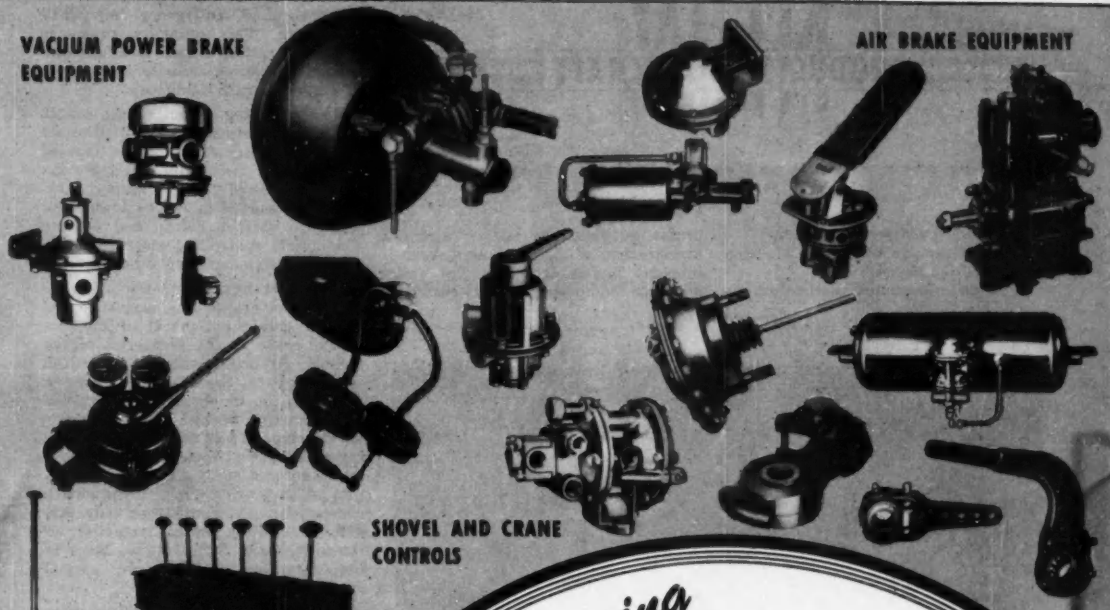
The conveyor carries the gear into position above the finishing cutter. Air operated centers on the machine then engage the gear (there being sufficient clearance between jaws and gear to permit light movement for alignment by the centers). A mechanical "finger" next comes down on top of the jaws, separating them and leaving the gear free to move at crossed-axis to the cutter. The machine goes through its cutting cycle and the mechanical "finger" releases to re-engage the gear in the jaws of the conveyor. The centers retract and the conveyor moves the gear out of cutting position and the next gear into position.

All movements of the installation are electrically interlocked and automatically sequenced. Actually, the conveyor itself controls machine operation and the usual electrical controls on the front of the machine are eliminated.

MIDLAND EQUIPMENT • • • DESIGNED AND ENGINEERED TO SAVE YOU TIME AND MONEY

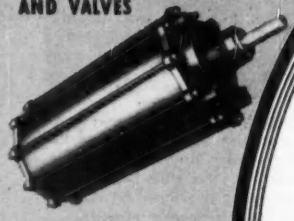
VACUUM POWER BRAKE EQUIPMENT

AIR BRAKE EQUIPMENT



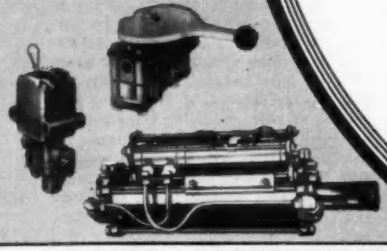
SHOVEL AND CRANE CONTROLS

INDUSTRIAL CYLINDERS AND VALVES



2 SPEED AXLE VALVES

BUS DOOR CONTROLS



Announcing

The New MIDLAND VACUUM HAND CONTROL VALVE

More Compact! Lighter Weight! Perfect Control!

An entirely new, more attractive design—more eye appeal. Gun metal finish, chrome trim.

Manifold and control line gauges with "Frostline" dials and luminous hands. Mounting brackets an integral part of valve. Inlet and outlet ports located in bottom of valve to simplify installation. Sturdy rachet type handle holds valve in any selected position.

There is a Midland Distributor near you to give you complete information—or write to us in Detroit.

The MIDLAND STEEL PRODUCTS COMPANY

6660 Mt. Elliott Ave. • Detroit 11, Mich.

Export Department: 38 Pearl Street, New York, N. Y.

WORLD'S LARGEST MANUFACTURER OF AUTOMOBILE AND TRUCK FRAMES

NEW PRODUCTS for AIRCRAFT

For additional information regarding any of these items, please use coupon on page 54

(*Continued from page* 52)
from the Graviner Mfg. Co., Ltd., originators of the device.

This piston-actuated mechanism operates automatically at an airframe deceleration of 3-G or more, and is intended for actuation of fire extinguishing equipment, relay controlled fuel valves, oil valves, battery cut-out switches and emergency signalling equipment. This equipment, proved in actual operation, is said to afford consistent protective security under even the mildest crash conditions.

The actuating piston of the switch is normally held in the set position by a bow spring. At a deceleration of 3-G or more, the piston overcomes the holding effect of the bow spring, causing it to snap forward to bridge the electrical contact points and operate the circuit controlling the fire extinguishing equipment, or other devices.

The reset button and the electrical connections are readily accessible, requiring only the removal of the protective cover at the front end of the switch. By pressing the button, which is painted red, the steel bow spring is reset and the weighted piston returned to its starting position. Two neoprene ears protrude from the front cover and serve as lead-in protection for the electrical connections. They are readily pierced to provide entry to the switch connections. A transparent body provides immediate visual inspection of the switch and four 3/16-in. holes in the mounting pad permit normal mounting.

U-10—Aluminum Gear with Steel Hub

A new gear made of aluminum, with a bonded-in steel hub, developed by the Al-Fin Division, Farmingdale, L. I., of the Fairchild Engine and Airplane Corp., Hagerstown, Md., is claimed to be lighter and stronger than molded resin and fiber gears, and capable of standing heavier loads.

The gears, hobbed and shaved, are declared as quiet in operation as the composition type. Made of aluminum alloy, bonded to steel with a molecular process originally developed by Al-Fin, the gears have a tensile strength of about 15,000 psi. The steel hub feature is said to eliminate danger of the aluminum gear conforming to the shaft. The gear has withstood shear tests of the bond up to 98,000 lbs.

Aluminum alloys are used for strength and heat treatment of the casting and develop a Brinell hardness of 85 to 120, depending upon requirements.

The Al-Fin process of molecularly bonding aluminum and its alloys to steel and iron is a development permitting fabrication of bi-metallic assemblies combining selected physical properties of both metals. Specifically, the company points out, it facilitates production of units requiring the strength, hardness, resilience, and fatigue resistance of steel with the light weight, high heat conductivity, excellent bearing properties, anti-corrosive qualities, and other characteristics of aluminum.

here's how

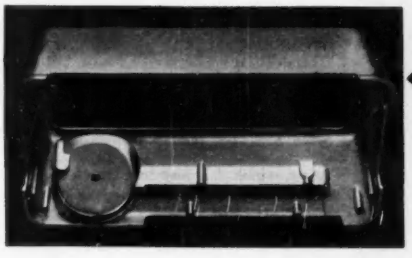
MAGNESIUM DIE CASTINGS

solve many problems.

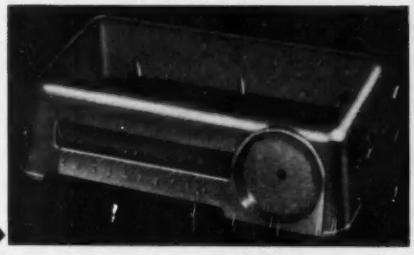
A Proved Material Competitively Priced

Magnesium has definite inherent advantages over other common die casting alloys, and—best of all—you don't have to pay a premium price to get them! In most cases *Dow magnesium die castings are competitive with other die castings* and in some cases they are cheaper.

Long past the experimental stage, magnesium has been tested and approved in a wide range of applications requiring an economically sound die casting material.



thin section over large projected area?



Dow can do it in Magnesium!

Wall thickness on the kitchen scale housing shown above ranges from .080" at the ends to .100" at the back, exemplifying the thin sections that can be die cast in magnesium. The over-all size of the housing is 12⅞" x 7⅛" x 3¼" yet the finished casting weighs just 12 oz.

You'll get many other advantages when you use magnesium die castings. Magnesium die casting alloys don't "creep" or "grow"—better tolerances are obtainable. Magnesium does not solder to the die—less draft required. Accurately located small diameter cored holes *with no taper* are possible in magnesium. When machining is required, you can do it faster with magnesium—it's the easiest of all die casting alloys to machine.

Use these inherent advantages to solve your die casting problems. Consult with Dow on design. They are experts in solving difficult die casting problems. Use Dow's high production die casting facilities to assure quality magnesium die castings at prices competitive with other alloys.

Write to Dept. MG-24

Magnesium Division

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Atlanta
Cleveland • Detroit • Chicago • St. Louis • Houston
San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

Sweat Cooling

(*Continued from page* 40)

which is much lower than that obtainable by conventional cooling methods.

Work which has been done on sweat cooling at the Jet Propulsion Laboratory, California Institute of Technology, has been aimed principally at determining the underlying principles of the sweat-cooling process. To this end tests were performed in a porous cylindrical duct one in. diam and eight in. long. The temperature of the stream of hot gas passing through the tube could be adjusted between 500 and 2000 F and the maximum velocity was about 2100 fps at a temperature of 1500 F. Gas was produced by burning gasoline and air in an especially designed combustion chamber. Cooling gas was injected through a porous cylinder in various quantities with both nitrogen and hydrogen being used as coolants. The porous cylinder was made of copper, stainless steel, or a nickel-molybdenum-iron alloy.

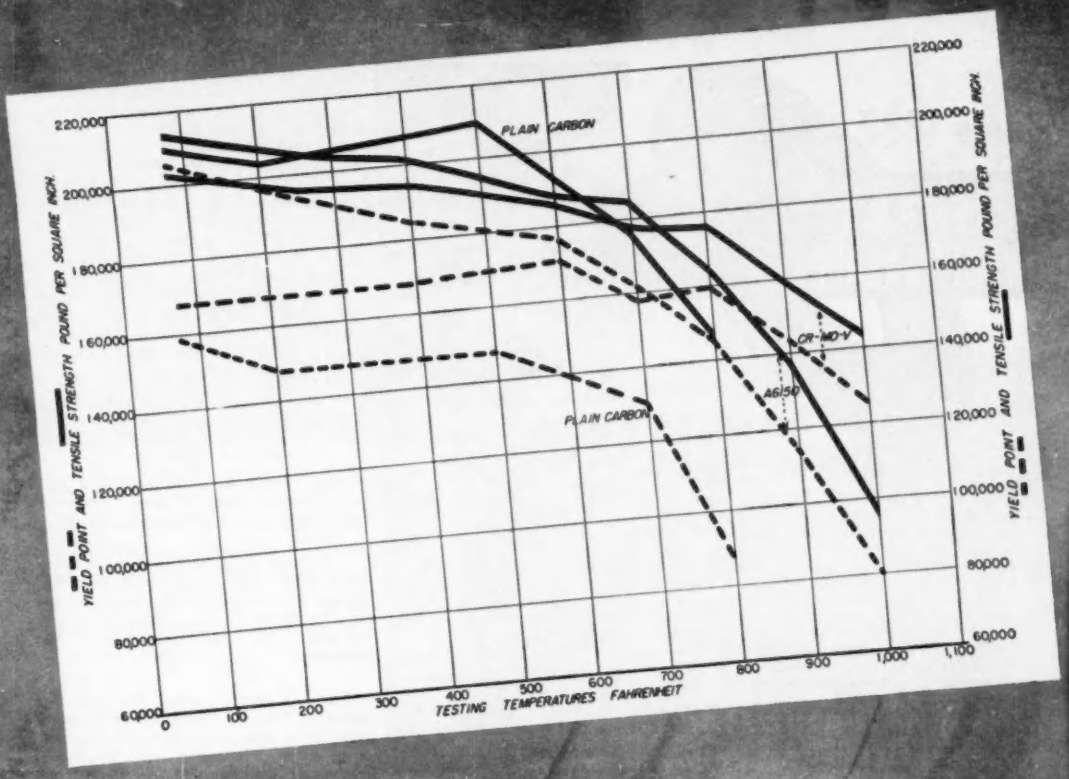
The test section containing the eight-in. long, one-in. diam porous cylinder shown in Fig. 1 was connected to the burner by a 20-in. straightening tube. Coolant was forced through the specimen from the annular space between the holder and the specimen. Temperature of the hot wall of the porous specimen was measured by thermocouples, and provision was made to allow for thermal expansion of the specimen by spring loading the downstream end of the holder.

Accurate determination of the temperature of the gas stream flowing through the one-in. diam test section was extremely difficult. Ultimately, it was found impractical to use anything but a beaded thermocouple supported in two-hole ceramic spaghetti and introduced into the gas stream through a hole in the straightening-tube wall. Weight of the air entering the burner was measured with a conventional rotameter.

Early experimental and analytical work on the subject of sweat cooling showed that a unique relation existed between the characteristic temperature ratio $(T_g-T_w)/(T_w-T_c)$ and the flow ratio Q/W. T_g, T_w, and T_c are respectively, the gas stream, the porous wall, and the coolant inlet temperatures, and Q and W are the weight flow rate of coolant and the weight flow rate of the gas stream per unit area normal to the direction of flow. A theoretical curve demonstrating the relationship of the two ratios is shown in Fig. 2. This curve, which is linear to a first approximation, has been derived assuming that both the coolant and the gas stream have identical properties. Two other curves of Fig. 2 show the results of the experiments using nitrogen sweat-cooled copper and nickel-molybdenum-iron alloy walls. The slight difference in the slope of the curves of the two wall materials is attributed to heat flow along the length of the specimen and the nature of the thermocouple installations.

It has been found that the nature of the wall material has only a minor influence on the sweat-cooling process, but the physical properties of the coolant have a very pronounced effect on the cooling performances. Hydrogen is a much more efficient coolant than nitrogen from the standpoint of weight required to produce a given cooling effect. This analysis indicates that the parameter which governs the relative cooling efficiencies of various coolant gases is the ratio between the specific heat of the coolant and that of the gas stream.

Some experimental work has been done toward the determination of the unit length pressure drop in sweat-cooled tubes, and it has been found that the pressure drop in these pipes is much higher under given conditions than in conventional pipes. Although this high pressure drop per unit length



HIGH TEMPERATURE PROPERTIES

of Cr-V and Cr-Mo-V Spring Steels

SPRINGS FOR SERVICE at elevated temperatures require steels which resist softening and lowering of the yield point. Unless hardness and yield strength are stabilized by correct alloy additions to the steel, these properties deteriorate rapidly as the temperature is raised.

The chart above shows the yield point and tensile strength of three types of spring steel at elevated temperatures determined by standard short-time tension tests.

Springs of plain carbon steel are sometimes used at moderately elevated temperatures, although their lower yield values prevent them from giving service as satisfactory as that of the alloy spring steels.

Chromium-vanadium steel springs, such as AISI 6150, give better service at ordinary temperatures because of the higher yield point. In addition, they may be used at operating temperatures up to about 700° or 750° F because they retain high yield point values as the temperature is increased.

Chromium-molybdenum-vanadium steel was especially designed for springs operating at temperatures in excess of 750° F. It can be used for springs operating at temperatures as high as 850° F or even higher under some conditions. At 800° F, the yield point of this steel is still greater than that of plain carbon steel at room temperature.

If you have a problem in spring applications at elevated temperatures, our metallurgical engineers will be glad to help you solve it.

MAKERS OF ALLOYS — VANCORAM — CHEMICALS AND METALS

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

of pipe is due to momentum changes resulting from the injection of coolant, a head loss factor analogous to the conventional friction factor may be derived. This head loss factor has been found to be a function of the flow ratio and the relative densities of the coolant and gas stream. It rises from the value of the conventional friction factor at zero coolant flow to three or more times that value in the range of normal sweat-cooling flows.

In spite of the uncertainties which still exist in the theoretical aspects of sweat cooling, it has proved itself to be a very efficient and an entirely practical method of cooling.

Men of the Industry

(*Continued from page* 25)

The Electric Auto-Lite Co.—The appointment of **Donald B. Seem** as Advertising Manager, has been announced.

AC Spark Plug Div., General Motors Corp.—The appointment of **Gordon W. Harry** as experimental engineer in charge of fuel pumps, has been announced. He succeeds the late **A. M. Babitch.**

Holley Carburetor Co.—The appointment of **John C. Holley** as Vice-President in charge of Sales, has been announced and the appointment of **E. V. Moore** as Vice-President in charge of Finance.

Nice Ball Bearing Co.—The election of **George Carleton, Jr.,** as President, has been announced. He succeeds **Walter H. Rossmassler,** who is retiring.

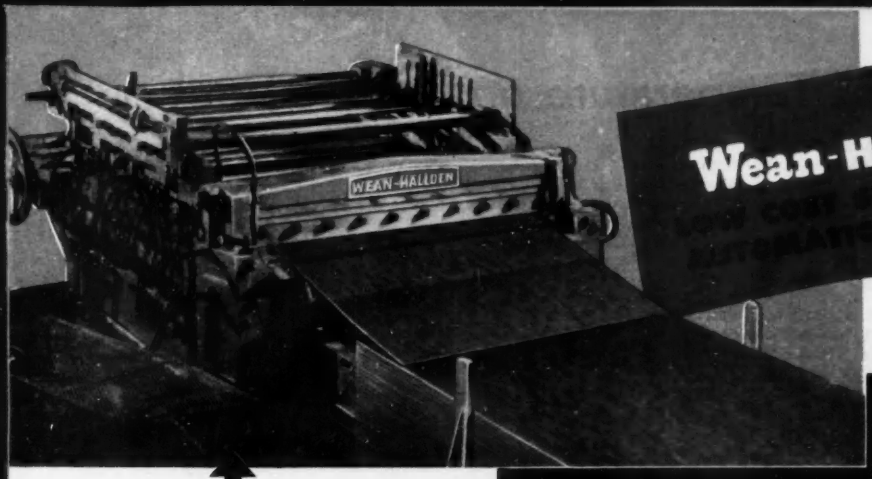
Kollsman Instrument Div., Square D Co.—**Emil P. Knapp** has been appointed Chief Product Engineer.

Kennametal, Inc.—Two new directors have been elected. They are, **George T. Kearns,** Treasurer of the company and **George G. Schuster.**

Dodge Mfg. Corp.—The appointment of **Kenneth Bassett** as Supervisor of Sales Promotion has been announced.

William & Harvey Rowland, Inc.—The appointment of **Howard J. Smith** as General Sales Manager of the company, has been announced.

K. O. Lee Co.—**Don C. Stablein** has been appointed General Manager of the company, succeeding **Don T. Lyons,** resigned.



Wean-Hallden

THE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring *less floor space*, delivers up to *twice the production.*

Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. *Before You Buy—Investigate Wean-Hallden.*

If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration.

Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate expensive extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

If you have a slitting problem — or merely desire a check on the efficiency of your present operation — call in Wean specialists.

Wean *Equipment Corporation*

CLEVELAND, OHIO

Effects of Temperature on Silicone Rubber

A recent investigation at the National Bureau of Standards under the joint sponsorship of the Office of Naval Research and the Quartermaster Corps has shown that the silicone rubbers, developed especially for high-temperature applications, have better potentialities for use at extremely low temperatures than any synthetic or natural rubber studied thus far. Since these materials are highly resistant to heat, retaining their elasticity and electrical resistance at temperatures as high as 400 F, they have been found especially well suited for hose and gaskets in airplane engines and for insulated cables.

In recent years a need has arisen for a type of rubber capable of withstanding low temperatures without loss of its characteristic rubber-like properties. Tires, belting, or other articles of ordinary rubber lose their elasticity around —60 F, presenting many difficulties in connection with the operation of motor vehicles and machinery in the Arctic or of airplanes at great height. To learn more about the possibilities of using the silicones for such low-temperature applications, the National Bureau of Standards undertook an investigation to determine the lower limit of the temperature range in which they retain their characteristic elasticity.

This lower limit was determined by locating the second-order transition temperature, a temperature at which a marked change in the slope of the length-temperature curve occurs. Such a change is observed in all rubbers and plastics and can be recognized as a discontinuity in the derivatives of volume, heat content, index of refraction, compressibility, dielectric constant, and other quantities with respect to temperature. A second-order transition differs from the ordinary first-order transition, or change of phase, in that no volume change or latent heat is involved. However, below the second-order transition temperature the type of molecular motion responsible for the useful properties of a rubber ceases, and the material behaves essentially as an ordinary solid. In practice a rubber becomes useless for applications requiring long-range elasticity at temperatures somewhat higher than the transition temperature, the exact amount of the difference depending on the particular application. Thus in natural rubber the second-order transition temperature is at —94 F, but the rubber is seldom useful below about —67 F.

In the Bureau's investigation, the necessary thermal expansion measurements were made in an interferometer. Small slabs of rubber were placed between the two quartz interferometer plates. Then, as the temperature of the interferometer was changed, the rubber slabs contracted or expanded, changing the distance between the plates and causing the interference fringes to the eyepiece to move relative to a fixed point of reference. The temperature of the specimens was recorded, and the number of fringes passing the reference point was counted as the temperature was varied slowly from —321 F to 212 F.

The silicone rubbers studied were all of commercial origin, and all except two, which were pure-gum silicones, contained fillers and vulcanizing agents. Several of the samples were especially designed for low-temperature applications. As only small differences in transition temperature were observed among any of these samples, it was concluded that fillers and vulcanizing agents have little effect on the second-order transition temperature. Additional measurements on two commercial

(*Turn to page* 116, *please*)

ADD UP TO 400 LBS.* EXTRA PAYLOAD CAPACITY PER TANDEM AXLE WITH ALCOA FORGED DISC WHEELS

Here's an economical way to reduce unsprung weight—and get other valuable operating bonuses in the bargain. Specify Alcoa Forged Aluminum Disc Wheels on your next truck or trailer order.

These light, strong wheels weigh 32 to 50 lbs. less per disc than corresponding steel wheels. They're precision-made to run true. Tire temperatures are lower, because the aluminum discs dissipate heat rapidly. What's more, they resist corrosion, do not require painting.

Ask your truck or trailer builder for facts and figures on Alcoa Forged Aluminum Disc Wheels. Available in 7.50 x 20 and 7.50 x 22 sizes.

*With forged aluminum hubs

Send for free booklet!

Gives full information on Alcoa Forged Disc Wheels—advantages, specifications, installation data. Write to ALUMINUM COMPANY OF AMERICA, 1841G Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FORGED ALUMINUM DISC WHEELS

ALCOA ALUMINUM ®

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

silicone rubbers not designed for low temperatures were in substantial agreement with those for the low-temperature silicones.

One variety of low-temperature silicone rubber was outstanding in that its expansion curve was essentially linear from 212 F until the second-order transition temperature of approximately —189 F was reached. Below this temperature a much lower coefficient of thermal expansion, more nearly like that of a rigid solid, was observed. All other silicone rubbers studied likewise exhibited a second-order transition at approximately —189 F, the lowest temperature at which such a transition has been observed in a polymeric material. However, the other silicones, on being cooled from room temperature, also went through a first-order transition at temperatures varying from —85 F to —103 F.

The first-order transition was observed experimentally as the very rapid passage of a large number of fringes past the reference point while the temperature was varied over a narrow range. This effect was interpreted as corresponding to a considerable decrease in volume associated with partial crystallization of the amorphous silicone. The crystallization process produces some stiffening and has apparently prevented the successful use of silicone rubbers below this temperature. However, the one variety which exhibited no first-order transition should have good possibilities for use at temperatures as low as —148 F.

Airbriefs

(*Continued from page* 44)

tentatively, the theory that while the airplane is diving at sonic speed, the noise of the shock waves cannot move ahead of the airplane but as the airplane pulls out of the dive the shock waves continue to earth and are heard as thunder by those on the ground. The issue involved is whether or not a shock wave makes a noise. Pilots cannot attest to this since they are riding ahead of the wing shocks and the sound cannot propagate forward. It is well-known that in wind tunnels shock waves are dissipated in a very few feet when the so-called "bump" technique is being used. Whether or not the noise of a shock wave could propagate through 25,000 ft of atmosphere is the question. Of course, explosions have been heard for more than one hundred miles but these are particularly high supersonic speed shocks, compared with which the slightly supersonic shocks over an airplane wing are infinitesimal indeed. The thunder noises are there but the question remains: "Why?"

Production Cuts Costs

Lockheed provides some interesting figures on the well-known economic facts-of-life in aircraft production, even in comparatively small production quantities. They report that Constellation No. 200, now rolling down the assembly line, will take just one-third the man-hours to build as did "Connie" No. 100 delivered three years ago. The last F-80 jet fighter, which rolled off the line last month after about 1700 had preceded it, took only 1/16 the man-hours to build as did the prototype and only 5% the number required in the original production run. Even the larger and more expensive P2V now requires less than 1/5 the number of man-hours spent on the original production order four years ago. This, of course, does not indicate that the dollar cost of these airplanes has dropped appreciably, since labor and other costs have risen so astronomically, but from the point-of-view of production mobilization planning, the figures are important testimony to the validity of long-range procurement programs.

WHY

THIS COMMUTATOR Can Stand The Most Rugged Service, Yet Costs Less To Produce

SMALL MOTOR COMMUTATORS made by the Spring Division of the Borg Warner Corp., Bellwood, Ill., from Revere OFHC (Oxygen-Free High Conductivity) copper, exploded to show method of construction. After copper shell was stamped and formed on multi-slide machine and plastic molding material injected into it longitudinal slats were sawed just deep enough to completely penetrate the thickness of copper and thus form the segments, each of which are insulated electrically from one another and anchored firmly in the plastic.

IT was quite a complex problem the Spring Division of Borg Warner Corp. dropped into the lap of Revere's Technical Advisory Service. They were getting set to manufacture commutators for small motors and they wanted to select the best material for the job.

Here were the specifications: The material had to be the hardest possible yet still able to take the extremely severe forming operation which was to be done in a multi-slide machine. High hardness was necessary in order to combine maximum wear resistance with the ability to withstand the extreme centrifugal force developed in small motors operating at high speeds. In addition, in the molding operation, which is done after the copper shells have been formed, it was necessary to hold the diameter of the shell to within .001" in order to prevent the plastic from flowing between the mold and the outer surfaces of the commutator. An equal tolerance was also imposed upon the height of the solid cylindrical portion for the same reason. Also of great importance was the need for the cylinder wall being almost absolutely flat.

Because of long experience with somewhat similar problems Revere recommended trial of OFHC (Oxygen-Free High Conductivity) copper, four numbers hard. This was tested along with several other metals. The OFHC alone was found to produce excellent parts, and with tolerances so close as to be almost unbelievable in this type of operation. All other types of copper failed at the very sharp bend where the anchoring lugs join the side of the shell.

An unusual feature of these commutators is the plastic material used in the core. Tough, and unusual in composition, it serves both as insulation and as a mechanical connection between commutator and shaft without use of a bushing and key.

To determine if these commutators could *really* take it, test motors in which they were used were speeded up to 35,000 rpm. Although the wiring in the rotors practically exploded at that speed, there were no failures in the commutators, Temperature tests up to 400° F. were also made. Here again there was no damage to the commutator, though the rotor wiring was badly damaged due to the combination of centrifugal force and decrease in wire strength. Once again the unusual combination of properties of Revere OFHC copper had played a part in helping another one of the country's leading manufacturers produce an outstanding product at less cost.

Perhaps this or some other Revere Metal can be of help in improving your product—cutting your production costs. Toward that end we suggest that you get in touch with your nearest Revere Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.
Sales Offices in Principal Cities, Distributors Everywhere.

Federal Accessibility Features

These illustrations of the new Style Liner series of Federal trucks show two special design features that provide greater accessibility to mechanical and electrical components. The Style Liner series was described in the June 1 issue of AUTOMOTIVE INDUSTRIES, page 37.

With the hood and swing-lift fender raised, the engine, engine accessories, steering gear, and front brakes are readily attainable. Either fender can be raised on a concealed hinge simply by releasing a clasp located at the rear of the fender. A removable panel (not shown), normally held in place by four assembly bolts, extends from the dash to the radiator shell and provides additional protection for the engine and its accessories.

All instruments, except the speedometer, are located on a hinged panel, thus giving easy access to the electrical wiring. This panel is held in place by means of a push button latch of the type usually found on passenger car instrument-panel compartments.

BOOKS . . .

KENT'S MECHANICAL ENGINEERS HANDBOOK—12th EDITION, published by *John Wiley & Sons, Inc., New York, N. Y.* The 12th Edition of Kent's, a tradition in engineering circles for over 50 years is offered in two separate volumes for convenience in reference and physical handling. "Design and Production" volume was edited by Colin Carmichael, editor of Machine Design, and the "Power" volume was edited by J. K. Salisbury, General Electric Co. According to the publisher, the two volumes have been completely rewritten and brought up to date with an expansion of around 10 per cent, listing more data but retaining its convenient size. Following former practice, the handbook stresses practice rather than theory and concentrates upon standard material secured from reliable sources.

SALES ENGINEERING, *2nd Edition*, by *Bernard Lester*, published by *John Wiley & Sons, Inc., New York, N. Y.* No matter what merit a product has, nor how well it is made, it must be sold. For machinery, equipment, and technical products are of value only when put to profitable use. That is the province of the sales engineer. The second edition of this well known text aims at the education of the sales engineer through case studies selected in many fields. Its purpose is twofold—to inform the younger technically trained man of the character of work done by the sales engineer; and to help the men engaged in selling to raise their sights and improve their skill.

Fully counterbalanced crankshaft—the ultimate in modern forging technique . . . Wyman-Gordon . . . crankshaft forging specialists since the introduction of the internal combustion engine . . . first to forge crankshafts with integrally forged counterweights . . . . . .

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS - - - DETROIT, MICHIGAN

Wider Use of Shot For Cleaning and Peening

Among the non-productive materials to enter prominently in the automotive picture are the various types of metal abrasives currently used for shot blasting—metal cleaning—and shot peening. While the technique of shot blasting is not new, recent investigations, particularly by General Motors Corp., have shown that a considerable part of the present cost of cleaning castings, forgings, and other parts is chargeable to drag-out losses (shot left in pockets of castings), losses in cleaning equipment due to lack of tightness of mechanism, and particularly large losses due to fragmentation of chilled iron shot.

Best estimates of consumption of metal abrasives for all industries place it at around 60,000 tons annually. Although it is difficult to estimate automotive consumption, it is probable that it ranges around 20,000 tons, maximum, based upon estimates of consumption by GM and other large users.

Shot peening, which became a must during the war, had been exploited almost exclusively in the automotive industries, primarily for the purpose of imparting extra durability to highly stressed parts. It is doubtful, however, whether total usage of shot for this purpose, for all industries, approaches 5000 tons annually.

In a paper entitled "Process Development," presented at the SAE Annual Meeting in January, 1950, R. J. Emmert, General Motors Corp., described studies made by the Corporation leading to the development of facilities for producing clipped wire shot for shot peening. Emmert showed some amazing cost economies incident to the use of clipped wire instead of chilled iron shot. Much of this economy comes from the greater durability of clipped wire shot and the virtual elimination of machine down-time because of shot fragmentation.

Introduction of clipped wire and its acceptance by GM divisions and others, has encouraged the entry of a number of independent producers of clipped wire. At the same time, the old established suppliers of cast shot have met this competition by introducing malleable shot some time ago, and steel shot more recently. Steel shot is claimed to have good durability and is being groomed as competition for clipped wire because of lower first cost.

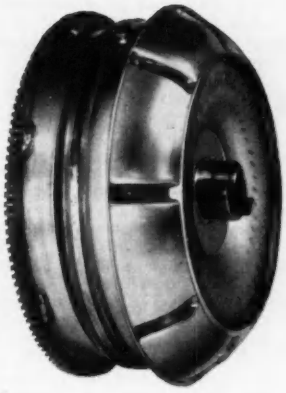
Among the experts there is a definite feeling that with improved shot, the rate of consumption may drop. Improved equipment design, and better housekeeping methods, coupled with shot of greater durability may reduce annual consumption below present figures.

On the other hand, wider adoption of shot blasting and shot peening should operate to increase the installation of more equipment in more plants and thus lift the level of shot consumption with its incident benefits to industry.

GM 110 Diesel Engine

(*Continued from page* 39)

Detroit Diesel's 184 established distributors and dealers and in Canada by the distributors of General Motors of Canada, Ltd., Oshawa, Ontario. In all other countries, the "110" will be sold and serviced by distributors and dealers of General Motors Overseas Operations or by the Foreign Distributors Division of G.M.O.O.

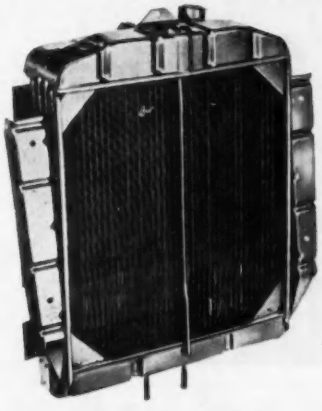


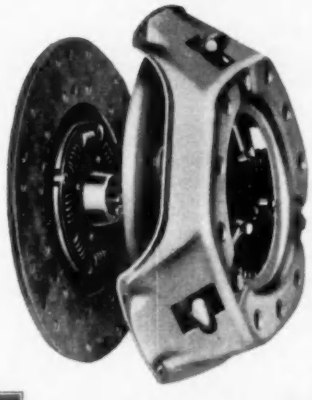
LONG TORQUE CONVERTER

Here's velvet-smooth power transfer, with torque multiplication of better than 2 to 1 at stall. Air-cooled for trouble-free service. Assembly units fabricated almost entirely from stampings for low-cost production.

LONG RADIATORS

Long radiators and maximum heat exchange have been synonymous throughout the automotive world since 1903. Fin-and-tube design and construction provide clean, unobstructed water courses. Capacities range from passenger car models to heaviest-duty commercial vehicle types.





LONG CLUTCHES

Effortless operation, dependable performance in stop-and-go traffic driving. At highway speeds, semi-centrifugal design gives increased torque capacity . . . less slippage, less wear. Long clutches have equipped millions of cars, trucks, buses and tractors since 1922.

ENGINEERING B-W PRODUCTION

LONG MANUFACTURING DIVISION
BORG-WARNER CORPORATION
DETROIT 12 and WINDSOR, ONTARIO

LONG

TORQUE CONVERTERS • CLUTCHES • RADIATORS • OIL COOLERS

Demand for Cars and Trucks

(*Continued from page* 31)

Motors. Obviously, smaller companies cannot grant such liberal benefits and there is a definite possibility of a strike at one or more large parts companies unless the union demands are modified. A strike at a major supplier such as Briggs or Electric Auto-Lite would throw sand in the gears of the humming Chrysler production line and a shutdown of some other suppliers to Ford and General Motors also would have a serious effect if prolonged for any length of time. Mention of labor is not complete without touching on the General Motors settlement. This agreement will have long-range effects on the manufacturing industry since it confirms a trend toward long contracts and a much more stable labor picture in the future.

Another important factor standing in the way of increasing production above current high levels in the critical sheet steel situation. Some companies say it is very doubtful whether they could expand output any further because the steel is not available. Demand for steel is so heavy that mills are unable to promise full requirements of the automotive industries despite capacity output.

Here are some of the reasons why manufacturers of automobiles look for the present high rate of production and sales to continue through the rest of this year and into 1951. Because the shortage of automobiles resulting from the war still exists, the normal replacement market remains very large. About 11 million of the 34 million passenger cars still in operation are ten years old or older and must be replaced over the next few years. Another important factor in the replacement market is that owners of earlier postwar cars are buying the latest models, pouring good used cars into that market and hastening the scrappage of overage automobiles. In addition, an increase of about 20 per cent in the nation's population since the mid-30's has opened up a vast new market, and with national income greatly increased it is indicated that the number of people able to buy new cars is about 35 per cent greater than before the war. In 1940 there were more than 27 million passenger cars on the road at a time when the nation's population contained 32 million families, or a ratio of 84 cars for every 100 families. In 1949 when there were 36 million cars on the road and 38½ million families, the ratio had increased to 94 automobiles for every 100 families. Economists forecast that the trend will continue upward to at least a point of one car per family. One factor that will accelerate this trend is the established pattern of residential shifts away from urban centers into suburban areas resulting in an expanded use of automobiles for transportation. It is generally believed that with the number of families increasing by 600,000 each year and the percentage of car-owning families also on the upgrade, average production for the next five years should at least equal the highest production of any prewar year.

Truck manufacturers also see sales holding high for an indefinite period ahead. About half of the 8 million in trucks in use today are eight years old or more and scheduled for replacement within the next seven to eight years, indicating a replacement market alone for these old vehicles of about 400,000 units a year. Added to that figure is the normal new use demand, so that basic requirements are estimated at from 900,000 to 1 million new trucks a year for the next seven or eight years.

Probably the one big question mark in the whole future of the industry is what will be the level of the economy. Since the war, experience has shown that the fortunes of the automotive industry are very sensitive to fluctuations in the economy of the country and particularly the psychology of the buy-

(*Turn to page* 124, *please*)

New Blue Sunoco Breaks All Records!

USERS SAY:

CADILLAC . . . "I use nothing but New Blue Sunoco in my 1949 Cadillac. I've tried a number of premium gasolines, but nothing can stand up to New Blue Sunoco for anti-knock power, mileage and all-round performance. New Blue Sunoco is also the only gasoline I use in all my wholesale meat delivery trucks."— JACK L. BIRENKRANT, Alden Park Manor, Detroit, Mich.

CHEVROLET . . . "I like the smooth power of my car since I've been using New Blue Sunoco. And I also appreciate the fact that I save money with every tankful."—JANE LYLES, 1531 N. W. 29th Court, Miami, Fla.

FORD . . . "I tried the New Blue Sunoco ten gallon test in my '50 Ford and got close to 4 miles more on a gallon. The performance is fine, and I notice more pep and power."— JOSEPH J. CUSHMAN, 8 Mill St., Dorchester, Mass.

Sensational new high-test gasoline scores greatest gain in Sun Oil history

ON APRIL 12, we introduced a new gasoline—*New* Blue Sunoco. Since then, we have sold more gasoline than in any equal period of our history.

What this means to you

These record-breaking sales of *New* Blue Sunoco prove that owners of every make of car are finding top performance *at regular gas price* with this sensational new high-test gasoline.

Sun Oil Company's policy of mass production and distribution of only one gasoline—top-grade *New* Blue Sunoco—pays off in satisfied customers for the cars *you* sell.

NEW BLUE SUNOCO

RADIO NEWS—Sunoco 3 Star Extra
NBC, Monday through Friday
6:45 p. m.

Memo to CAR DEALERS

Make sure your customers keep on getting top performance from the cars you sell. Recommend sensational New BLUE SUNOCO. And when you're demonstrating your 1950 cars, fill them with New BLUE SUNOCO — the new high-test gasoline that's packed with NEW HIGH ANTI-KNOCK POWER!

High-test at Regular Gas Price

ing public. A case in point is a definite slump in truck sales last Summer and early Fall and the corresponding slowness in passenger car sales toward the end of last year. Obviously the need and demand for automobiles and trucks was greater than it is now, since about 3 million new cars and trucks have gone into the hands of users since that time. However, there was a psychology of hesitation abroad in the land, closely linked to the slump in other lines of business at that time. Since then optimism has risen and the buying public is willing to spend its money for new products. A contributing factor in this respect appears to be an awareness on the part of the buyers that prices are not going to decline. In fact, at the moment the subject of car prices is something of an enigma. For the first time since the war prices of automobiles and trucks have not been kited following contract settlements with unions, resulting in higher labor costs. Contracts settled thus far have been largely for pensions and insurance benefits which represent increased labor cost just as surely as do straight cents-per-hour wage boosts, but because of high volume and increased efficiency, these costs have been absorbed for the time being. However, with material costs rising and as suppliers complete new labor contracts increasing their costs, a price increase would not be too surprising late this year especially by the smaller companies without the volume and efficiency that would permit them to absorb higher costs. At the moment, however, there does not appear to be any price increase imminent.

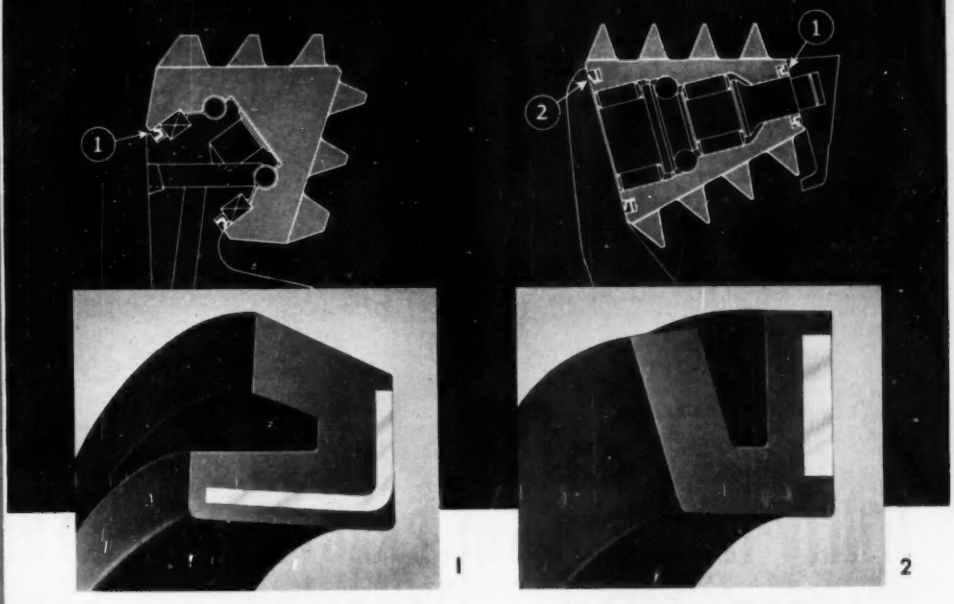
The used car market also is holding up well despite a slight decline in prices since the peak reached in May. Volume, however, is holding well and most of the trade believes that business will remain good through the Summer months and into the Fall with prices remaining fairly well stabilized.

One thing to watch in connection with both the new and used car business is the expansion in automobile installment credit. Although the outstanding automobile credit has been climbing steadily month by month, there is as yet very little alarm about the situation since credit agencies say that there is less automobile financing today in relation to the national expendable income than there was in 1941. Currently, the delinquent rate is very low and collections are better than they have been at any time in the last two years.

The automobile replacement parts business is another one that already is showing definite signs of being much better than had been predicted at the outset of 1950. General belief now is that total automobile parts business this year will be about five to seven per cent ahead of 1949 contrasted with earlier estimates that it might be off about 20 per cent.

NATIONAL OIL SEAL LOGBOOK

Where the bearings are immersed in abrasive mud— the oil seals have to be good



Oil well drill bits employ anti-friction bearings in rotating cone bits. Under certain earth strata conditions the life of these bits is measured in minutes. When bearings become clogged with abrasive grinding muds or cuttings, drill bit life is materially shortened. Consumption of drill bits and the loss of time required changing them is a major cost factor in oil well drilling operations.

In an effort to lengthen the life of these devices, National Oil Seal engineers have developed a special oil seal to keep abrasive grinding muds out of the bearings. The seal employed is a springless type, external wipe, utilizing Syntech* (synthetic rubber) wiping lip. The rubber compound which forms the wiping lip completely surrounds and is banded to a rugged steel flange frame which will not become easily distorted. The wiping lip itself is unusually thick and sturdy (Fig. 1) and is capable of withstanding the extreme pressures encountered.

These seals are being employed in two types of oil well drill bits. In one bit (above left) a single seal is used with each drill cone. In the other (above right), of radically different design, there are two seals per cone, one of which is a springless face type (Fig. 2) of new design.

Helping solve the problems of bearing protection in these applications is typical of the kind of service you can expect from National Oil Seal engineering. In all cases effort is made to utilize standard designs to save you the expense of special tooling. However, if your problem is different, we'll be glad to apply our ingenuity and long experience to it.

*Trade Mark registered

CALL IN A NATIONAL ENGINEER FOR RECOMMENDATIONS

BUFFALO, N. Y.	56 Arlington Place, Grant 2280
CHICAGO, ILL.	Room 2014 Field Building, Central 6-8663
CLEVELAND, OHIO	210 Heights Rockefeller Bldg., Yellowstone 2720
DALLAS, TEXAS	30½ Highland Park Village, Justin 8-8453
DETROIT, MICH.	Room 1026 Fisher Building, Trinity 1-6363
HOUSTON, TEXAS	6731 Harrisburg Boulevard, Wayside 3-1246
LOS ANGELES, CALIF.	2244 East 37th Street, Kimball 6384
MILWAUKEE, WIS.	647 West Virginia St., Marquette 8-8986
NEW YORK CITY, N. Y.	122 East 42nd Street, Lexington 2-8260
PHILADELPHIA, PA.	401 North Broad Street, Bell-Walnut 2-6997
REDWOOD CITY, CALIF.	Broadway and National, Emerson 6-3861
WEST SPRINGFIELD, MASS.	1025 Elm Street, Springfield 2-1881
EAST SYRACUSE, N. Y.	226 Raby Avenue, East Syracuse 366
WICHITA, KANSAS	340 North St. Francis Ave., Wichita 2-6971

"Let your decision be based on precision"

NATIONAL OIL AND FLUID SEALS

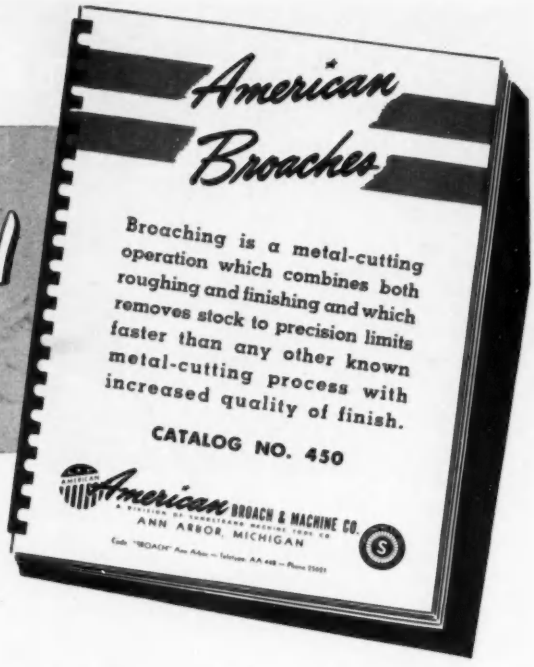
NATIONAL MOTOR BEARING CO., INC.

General Offices: *Redwood City, California*
Plants: *Redwood City and Los Angeles, Calif.; Van Wert, Ohio*

3070

Reprints from this or other Logbook pages are available for your files. Request them from our Redwood City, California office

NOW! Ready for you



The NEW American Broach CATALOG NUMBER 450

Thirty-Two Pages of PRACTICAL, USEFUL INFORMATION and ENGINEERING DATA

Partial List of CONTENTS

- Typical Broached Parts
- Broach Design
- Internal Broaches
- Surface Broaches
- Broach Pullers
- Keyway Broaching
- Resharpening
- Care of Broaches
- Broaching Machines
- Internal Broaching
- Surface Broaching
- Fixtures

Yours for the asking! This new manual of broach information is a valuable engineering aid. It contains dozens of photographs and blueprint drawings that will serve to outline the numerous ways broaching can cut production costs.

Designed For Easy Use —American Broaches — Catalog Number 450 is divided into two sections. Section I describes broaches of various type for internal or surface broaching. It also includes push and pull heads, resharpening information, tips on handling and complete terminology. Section II is a pictorial demonstration of twenty different types of broaching case histories with interesting production figures. Also a complete table of standard American keyway broaches.

Ask For Your Copy *Write today for your free copy. (On your company letterhead, please.) Ask for Catalog No. 450*

VISIT OUR NEW CHICAGO OFFICES
Room 1540, Merchandise Mart Bldg.
Phone Whitehall 4-4336

AMERICAN **American BROACH & MACHINE CO.**
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

See *American* First—for the Best in Broaching Tools, Broaching Machines, Special Machinery

Excessive deadweight is sheer waste–

reduce it with MAYARI R

Why build unnecessary deadweight into a truck body when it only increases the cost of operating the vehicle? It's good business to cut surplus deadweight when you can do it with a moderately priced, low-alloy, high-strength steel like Mayari R.

Because its yield point is almost double that of plain carbon steel, Mayari R can be used in lighter gages with considerably higher unit stresses. Strength is not sacrificed.

Because it has 5 to 6 times greater resistance to atmospheric corrosion, thinner sections of Mayari R will outlast heavier sections of carbon steel. Service life is not reduced.

The cost of fabricating and welding Mayari R is generally the same as for ordinary steel. The usual methods and equipment are used with only slight allowances needed for its higher properties.

Further information on the applications of this superior grade of steel is readily available at any of our sales offices. Ask for a copy of Mayari R catalog No. 259.

By building the body and cab shield of this dump truck from 10 gage Mayari R instead of 8 gage carbon steel several hundred pounds of surplus deadweight were eliminated. The body was fabricated by American Sheet Metal Works, Portland, Oregon, and assembled by Newell Truck Equipment Co. of Portland.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation.

★ BETHLEHEM STEEL ★

Mayari R *makes it lighter... stronger... longer lasting*

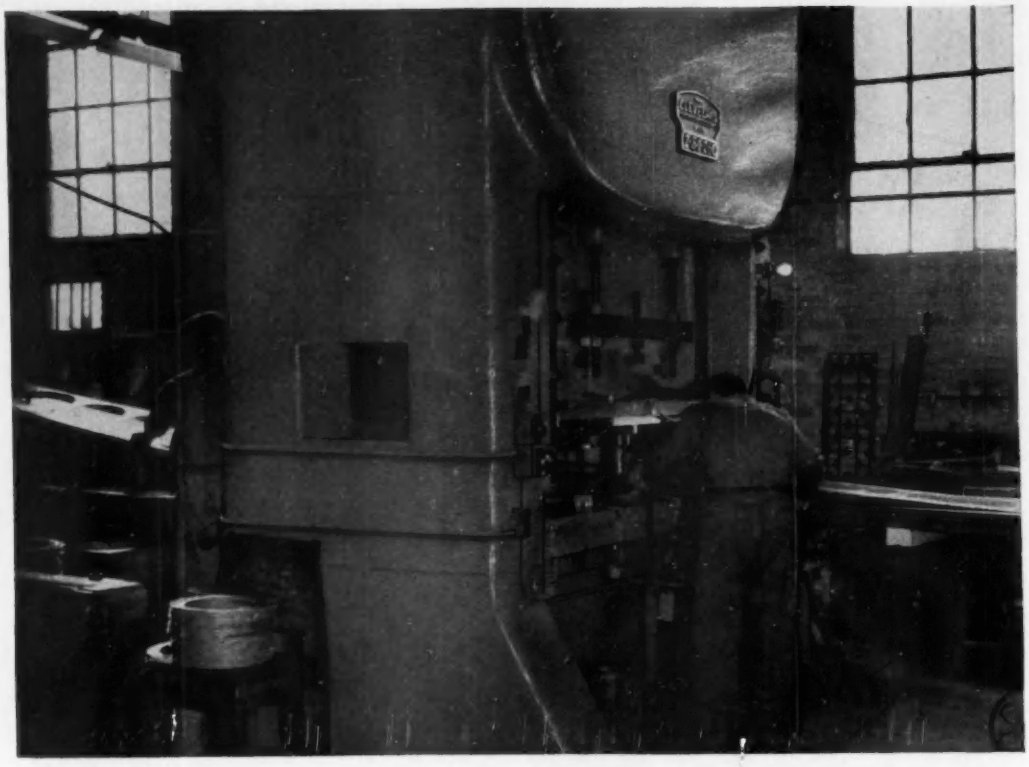
An Ajax Forging Roll...
Saves a Lot of Time and Money

No. 2 AJAX FORGING ROLLS in operation at Pittsburgh Forgings Company, Coraopolis, Pa.

The fast, simple operation of pre-rolling forging blanks in an AJAX Forging Roll greatly facilitates subsequent impression die forging. Wherever a reduced straight or tapered section is required on a blank of large cross section or where the drawing of a slender shank is required on pieces that have been previously forged, the AJAX Roll can do the work many times faster than the fastest swagers or hammers. In addition to the advantage of greatly increased forging production is the improvement in the quality. The metal is well distributed to accurately fill the die impressions, with minimum flash, and increased strength results from the improvement in grain flow. The choice of sizes in AJAX Forging Rolls and the wide adjustment feature of the Rolls makes it possible to install just the right roll to meet your needs and at the same time increase the range of your production forging equipment.

Write for Bulletin 91-A

THE Ajax MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
110 S. DEARBORN ST. CHICAGO 3, ILLINOIS
DEWART BUILDING NEW LONDON, CONN.



After 100,000 stampings no noticeable die wear!

At the Lakeside Metal Stamping Company of Cleveland, the Two-Point Cleveland Press shown above has been in steady operation for over seven years. In that time, according to Mr. Ollie Miller, plant manager, it has never been down for a major overhaul, control has always been fast and accurate, the gibs have required no attention in four years. "Best of all," Miller added, "It is the easiest Press on dies that I have ever seen. Often we have stamped over 100,000 airplane brake drum rings from a single set of dies, with no noticeable die wear. During these runs we held to a tolerance of .004"."

Because similar outstanding Press performances are being compiled daily by Clevelands, we are confident in urging you to investigate the production economies built into every Cleveland Press. Get a Cleveland—its trouble-free operation, rigid construction and exact control, provided by the patented Cleveland Drum Type Clutch, will give you lower production costs and longer die life. A-3148

THE CLEVELAND PUNCH & SHEAR WORKS CO. U.S.A.

Established 1880

PUNCHING TOOLS & DIES

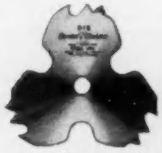
FABRICATING TOOLS

POWER PRESSES

OFFICES AT:
NEW YORK....CHICAGO
DETROIT....PHILADELPHIA
PITTSBURGH

CLEVELAND 14, OHIO

For maximum hardness and minimum distortion



Outside cutter of Disston D-15 Dado

DISSTON MANSIL TOOL STEEL

Deep hardening, Non-deforming, Uniform

Die and punch of Mansil Tool Steel used in the making of 5½" dia. Dado cutters from annealed 53-75 steel containing .70/.85 carbon and .61/.80 manganese. Raw material is .109" thick, finished .093".

Disston Mansil Tool Steel is one of the most dependable tool steels ever produced. You can rely fully upon it in forging, machining, grinding and heat treatment. Exceptionally well suited for making intricate shapes and wherever varied cross sections must be deeply hardened.

Because of its non-deforming characteristics in hardening, good machinability and long life, Mansil Tool Steel is specified for blanking and forming dies used in the production of thousands of steel specialties. It can be annealed very soft, with small, well spheroidized carbides. Upon correct heat treatment, this structure changes to a fine martinsite . . . the fracture grain, too, will be fine, ranging from 9 to 10 Shepard.

Use Mansil Tool Steel for dies, punches, broaches, forming shears, gauges, hobs, reamers, taps, test plugs, master tools and similar applications.

ANALYSIS OF MANSIL TOOL STEEL

Carbon	.90%	Chromium	.50%
Manganese	1.15%	Tungsten	.50%

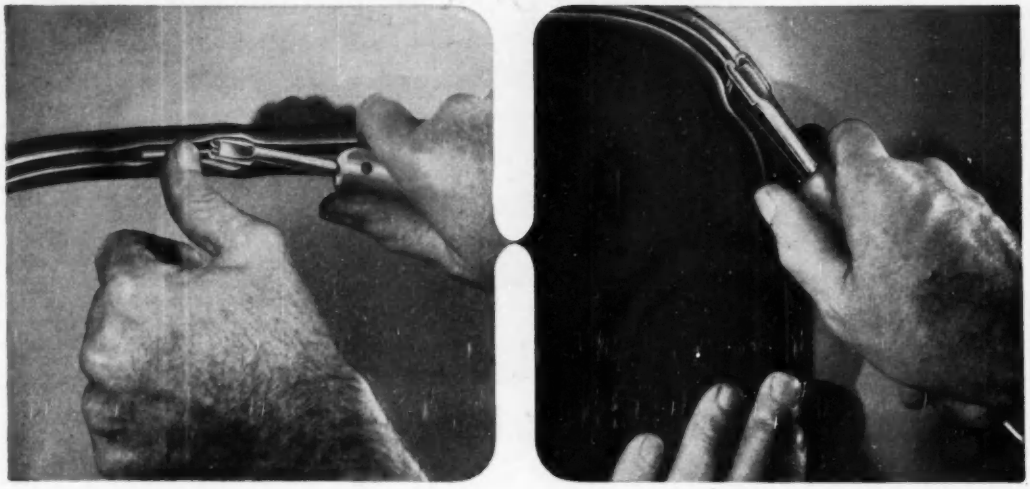
●

DISSTON ENGINEERS AND METALLURGISTS will be glad to help you solve any of your tool steel problems.

STEEL—Everybody who wants to obtain steel can help himself to get it by immediately starting scrap into the channels that serve steel mills.

HENRY DISSTON & SONS, INC., 731 Tacony, Philadelphia 35, Pa., U. S. A.

So Fast! So Easy! So Low in Cost!

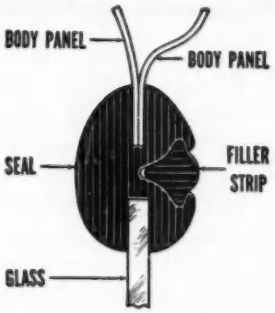


Inland Self-Sealing Weather Strip saves in production, protects permanently

It works like magic, saving time and slashing costs in the glazing of windows and windshields in buses, trucks, cabs, any commercial vehicles. One man only quickly installs Inland Self-Sealing Weather Strip . . . without subassembly, preparation, clamps, frames, moldings, cement, reworking or cleanup.

Inland Self-Sealing Weather Strip provides a permanent mechanical lock by itself . . . can't work loose or wear out. That means permanent weatherproofing . . . and complete protection, too, in any weather. It's why vehicle users prefer Inland Weather Strip, specify it whenever they can.

A wide variety of designs and shapes have been developed by Inland engineers to fit both standard and special body-panel openings. Write today for new catalog, containing full information.



See how easy it is? The seal goes readily onto the body panel. Then the glass fits into the seal. Then the filler strip is zipped into the locking channel. That window or windshield, and all the rest of them, are weatherproofed for keeps. Simple, easy, fast, economical.

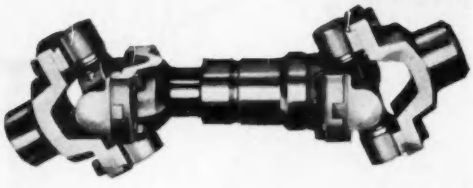
INLAND MANUFACTURING DIVISION
GENERAL MOTORS CORPORATION DAYTON, OHIO

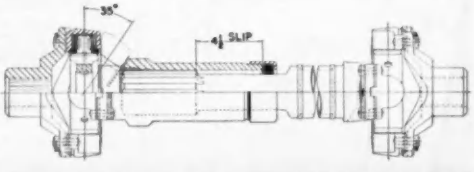
INLAND MANUFACTURING

Self-Sealing Weather Strip (PATENTED)

MECHANICS Are Used on the TOUGH JOBS — Such as Industrial LOADERS

Designers with JOINT problems have learned to rely on MECHANICS. In the industrial loader field, for example — where joints must run all day at constant angles up to 45° — where there are severe shock loads — where wide angles *and* long slip are common — and where dirt and/or moisture are continually present — MECHANICS Roller Bearing UNIVERSAL JOINTS are the accepted solution. Lifetime or once-a-season lubrication is so tightly sealed in that dirt and moisture cannot enter. If you have a "tough" joint problem, it will pay you to make use of MECHANICS engineers' wide experience in solving power transmission problems in hundreds of different fields.





MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Avenue, Rockford, Illinois

Stop Grinding Tie-Ups...

Spot These Grinders Around Your Shop

ONLY $38

Why Tie Up Work by having your men lined up waiting to use a Bench Grinder . . . when you can keep jobs moving by spotting enough Black & Decker 6" Standard Bench Grinders around your shop?

ONLY $38

At This Low Price you can afford to have B&D 6" Standard Bench Grinders within easy reach of all your workers . . . to save steps, save time, save money!

ONLY $38

Speed Up tool sharpening, "run - of - shop" grinding jobs, cleaning, burnishing, buffing!

ONLY $38

Many Practical Features you wouldn't expect to find at such a low price . . . B&D-built ¼ H.P. constant-speed motor; full-size ball bearings; steel wheel guards; adjustable tool rests locked in base grooves; new styling for better working clearances!

ONLY $38

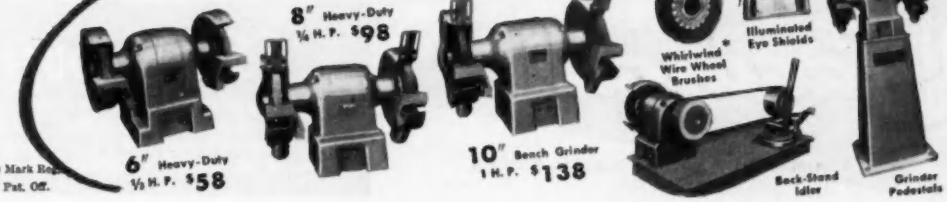
See Your Nearby B & D Distributor for details on 6" Standard Bench Grinders, other models for heavier duty, many accessories. Write for free catalog of over 100 Portable Electric Tools to: THE BLACK & DECKER MFG. CO., 635 Pennsylvania Ave., Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

Buy BLACK & DECKER— the Complete Bench Grinder Line!



*Trade Mark Reg. U. S. Pat. Off.

STREAMLINE THE STEERING COLUMN, TOO— with

SSG COAXIAL TRANSMISSION CONTROL

Here is true functional styling. The unsightly rods and wires of the old-fashioned steering column disappear into a smart streamlined cylinder.

The trend to center dash instruments in front of the driver calls more attention than ever to the steering column. This handsome treatment gives your design the fine car look.

Look at the features you gain with the SSG Coaxial Transmission Control:

FUNCTIONAL STYLING—Cleans up the driving compartment. Conceals unsightly rods and wires.

"FEATHER-TOUCH" ACTION—Larger, sturdier bearings stay in alignment—give easy, quiet action.

POSITIVE ENGAGEMENT—Rugged construction assures positive shifting every time.

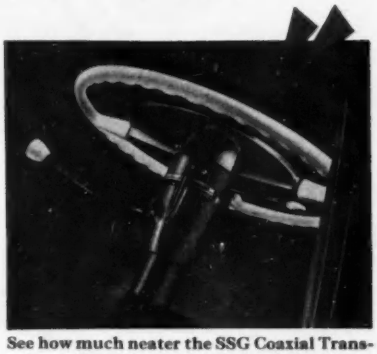
PROVEN DESIGN—Hundreds of thousands of these units in use prove acceptance of this idea.

AUTOMATIC OR MANUAL—Either type of transmission operates equally well with this control.

RATTLE RESISTANCE—Greater shaft and bearing diameters reduce rattles caused by whip and wear.

FOR FURTHER INFORMATION, WRITE OR PHONE—

Here is the last remnant of the "works" still exposed in modern car design. The rod and wires elsewhere are concealed by the dash panel, hood, trim, etc.



See how much neater the SSG Coaxial Transmission Control makes this steering column. Note also the SSG Turn Signal Switch faired into the wrapper.

Saginaw

STEERING GEAR DIVISION

[illegible] Corporation, Saginaw, Michigan

SSG PRODUCTS

STEERING GEARS AND LINKAGES • PROPELLER SHAFTS • TRANSMISSION CONTROLS • TURN SIGNALS • DIESEL ENGINE PARTS • BALL BEARING SCREW AND NUT ASSEMBLIES • AUTOMOBILE JACKS

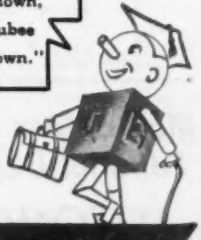
Hand your headaches to "CUBEE"

curing Plastics Problems is his business!

Take advantage of experience the next time you have a problem involving Plastics. Five of the key people here have a total of more than 75 years experience in this business.

We offer all of the services you need—designing, die-making and molding—all under one roof. It pays to utilize our "know-how". After all, Plastics is our business. Call "Cubee" the next time you are planning in Plastics.

Q-B Says:
"The next time you are stymied
And a problem's got you down,
Hand your headache to Cubee
He can wipe away that frown."



QUINN-BERRY CORP.
2647 West 12th Street
ERIE, PENNSYLVANIA

Quinn-Berry Corp.
PLASTICS

Branch Offices

MR. HARRY R. BRETHEN
11341 Woodward Avenue
Detroit, Michigan
Townsend 8-2577

PARAGON SALES COMPANY
111 S. 22nd Street
Philadelphia 3, Pennsylvania
Rittenhouse 6-5609

To make

AUTOMOTIVE INDUSTRIES

even more useful to you

we offer . . .

The AUTOMOTIVE INDUSTRIES Editorial Index covering all issues from January 1, 1950 to June 15, 1950, inclusive

The new AUTOMOTIVE INDUSTRIES Editorial Index will be available soon. It saves hours of searching for specific subjects covered in past editions.

This handy index provides you with a quick summary of ALL the editorial articles, listed alphabetically by subject, along with page numbers and dates of the issues in which they appear. Also includes a cross-index by author and company mentioned.

The supply is limited, so order your copy now by enclosing check or cash for 50 cents, with the coupon below. If, at the same time, you wish to order the index for the next 6-months' issues (July 1, to December 15, inclusive), enclose $1.00. It will be sent upon publication.

Mail coupon today to Editorial Department

AUTOMOTIVE INDUSTRIES

Chestnut & 56th Sts.
Philadelphia 39, Pa.

Please send me the new AUTOMOTIVE INDUSTRIES Editorial Index covering the 12 issues from January 1, to June 15, 1950, inclusive, for which I enclose 50¢. (I would also like to order the next 6 months' index, both for $1.00, which I enclose.) Forward index to:

.....

Company .....

Street .....

City ..... State .....

ZYGLO*

Cracks in carbide and poorly bonded braze joints highlighted by Zyglo on multiple tipped cutter.

Zyglo brilliantly reveals cracks and poor bonding in these cutting tools.

Puts the Finger on Causes of Tool Failure at 4 POINTS

1. TOOL MANUFACTURERS inspect before shipping

2. TOOL USERS inspect before using

3. TOOL CRIBS inspect before re-issue after grinding

4. TOOL GRINDERS inspect to check on grinding methods

Especially with valuable carbide tools, inspection with Zyglo* saves costly losses that occur when a cutting tool fails: — destruction of the entire tool, damage to the work, down-time of the equipment, new set-up by highly paid men, etc. Zyglo makes 100% inspection practical because it is fast and non-destructive.

You can forestall these losses at 4 significant points: 1) Certain tool manufacturers use Zyglo to assure themselves that only perfect tools are finish ground and are shipped; 2) Many users make a *receiving inspection* with Zyglo before putting a tool in service; 3) At the tool crib Zyglo inspection is used after grinding to okay tools before re-issue; 4) Zyglo inspection used in a study of grinding techniques aids in standardizing on methods that prevent damage. One tool manufacturer reports his Zyglo installation had justified its entire cost in the first few weeks by correcting the grinding method on two difficult tool forms which had previously caused great difficulties.

We would welcome correspondence on this subject with tool men who want to investigate savings with Zyglo. Write us.

These Tool Manufacturers Use ZYGLO as Quality Control on Fabricated Tools Before Releasing to Customers

Cadillac Gage Company, Detroit, Michigan
Dawson Carbide Industries, Inc., East Detroit, Michigan
Genesee Tool Co., Fenton, Michigan
National Twist Drill & Tool Co., Rochester, Michigan
True Setting Diamond Co., Ferndale, Michigan
Arrow Tool & Reamer Co., Detroit, Michigan
Bokum Tool Co., Detroit, Michigan
Eclipse Counterbore Co., Ferndale, Michigan
American Cutter & Engineering Corp., Warren, Michigan
Carbide Tool Company, Detroit, Michigan
Crucible Steel Company of America, Harrison, New Jersey
Heald Machine Company, Worcester, Mass.
Barber-Colman Company, Rockford, Illinois
Vasseley-Ramet Corp., Waukegan, Illinois
Ingersoll Milling Machine Co., Rockford, Illinois

Not Only ZYGLO with Carbide Tools

All the advantages offered above on non-magnetic materials are obtainable for steel tools and dies by magnetic particle inspection plus fluorescent indications under black light. Ask about MAGNAGLO

MAGNAFLUX CORPORATION

*Magnaflux, Magnaglo, trademarks of Magnaflux Corporation applied to equipment and materials for use with magnetic particle and fluorescent magnetic particle inspection methods.

MAGNAFLUX CORPORATION

5906 Northwest Highway, Chicago 31, Illinois

New York • Cleveland • Detroit • Dallas • Los Angeles

Export Distributor: Curtis Wright Corp. In Canada: Williams & Wilson, Ltd.

— THE WAY THEY'RE DESIGNED

— THE WAY THEY'RE BUILT

Make HOUDAILLE* your Best Shock Absorber Buy

Any product must be correctly designed *and* correctly built to give the service and life your owners have a right to expect. When it comes to shock absorbers, you can bank on Houdailles on *both* these scores.

Houdailles are produced by America's pioneer builder of hydraulic shock absorbers — by the company with the longest experience and the broadest engineering background in the industry.

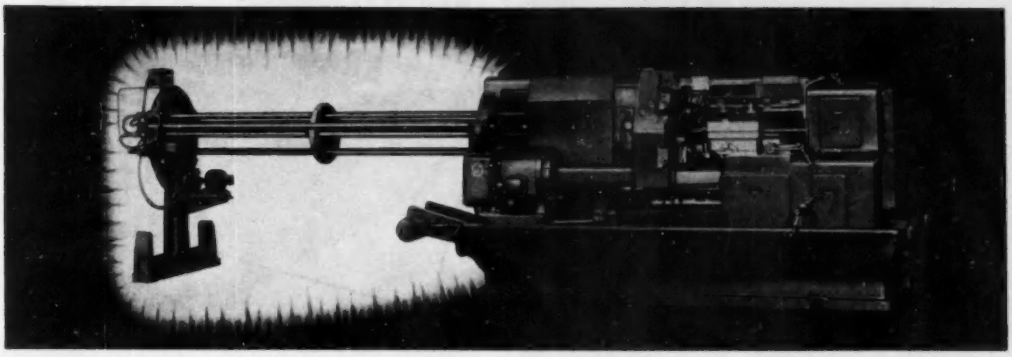
Houdailles are built of the finest materials as you, yourself, can easily determine. They are built to the high standards and minute tolerances of precision instruments — and protected by an exacting system of quality control and inspections to guarantee the dependable uniformity of every one that is shipped.

Yes, the way they're designed and the way they're built make Houdailles your best shock absorber buy. Won't you make an appointment to discuss your specific problems and needs.

HOUDAILLE-HERSHEY CORPORATION
HOUDE ENGINEERING DIVISION
BUFFALO 11, NEW YORK
America's Pioneer Builder of Hydraulic Shock Absorbers

* Say "Hoo-dyë"

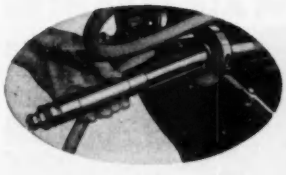
FEED OUT ANY LENGTH TO 16½" WITHOUT PUSHER MARKS!



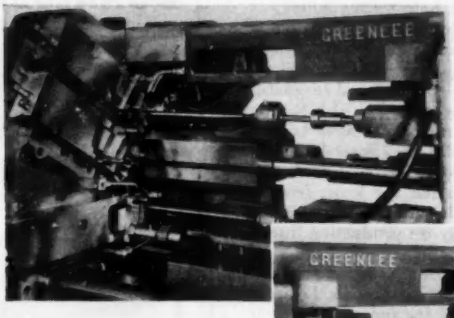
with GREENLEE AIR-FEED AUTOMATICS

Stock scoring — a necessary evil with conventional feed fingers — has often prevented certain jobs and materials from being handled on automatics, and has resulted in higher production costs. Now stock scoring can be completely eliminated by using Greenlee 1-inch 6-Spindle AIR-FEED Automatics which do away with the usual mechanical stock pusher arrangement. Instead of being gripped, the stock is moved forward smoothly and rapidly by an air-propelled piston in each stock reel tube.

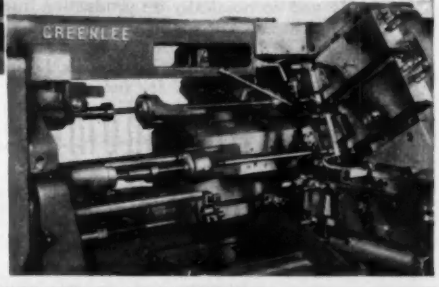
There are other advantages, too. Quicker setups are possible by the elimination of stock pusher changes for different size stock. Multiple feed-out arrangements can be easily adapted, requiring only the setting of stock stops and collet openers at the desired feed-out positions. With only the air behind it, the stock will feed out in *any* of five positions to wherever the stop is set. On simple cut-off and form jobs, this permits production of 2 or 3 pieces per cycle. Investigate Greenlee AIR-FEED for *your* shop.



Showing the piston inserted in the stock reel tube, to push the stock by air pressure. A suction pump returns the piston for reloading the tube.



Left, stations 1, 2, and 3 of a machine set up for multiple feed-out. The piece in this case is 16-3/32" long and requires only forming to a smaller diameter at one end. Live bushings ahead of the stops are used to prevent whipping.



Right, rear view of the same machine as above, showing positions 4, 5, and 6. The stock feeds out at positions 1, 3, and 5 and is formed. Cut-offs are at positions 2, 4, and 6 and chutes (not shown) are rigged to slide finished pieces away from the working area.

PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO.
1757 Mason Ave., ROCKFORD, ILL.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

HI-EFF

SENSITIVE DRILLS

Holes Down to .002" Diameter
Speeds Up to 40,000 R. P. M.

It requires HI-EFF precision to hold a fast running drill to close tolerances. With the combined run-out of spindle and chuck held within .0001", drill life is longer, scrap losses fewer. For positive lubrication and freedom from vibration, spindle and spindle pulley bearings run in a vapor-like cloud of oil. To provide the correct speed for each operation, standard models of the HI-EFF Series "A" Drills have a speed range of 800 to 10,000 R.P.M. in steps of 100 R.P.M. (Special models range up to 40,00 R.P.M.)

Designed and constructed for super-sensitive drilling, HI-EFF drills are performing efficiently and economically on production lines, in tool and instrument rooms. If you have a high precision drilling job, for hole sizes .002" to ⅛", write for details. (Also available are HI-EFF Series "B" Drills for holes .010" to ⅝".)

Taylor Dynamometer and Machine Company

5111 WEST CENTER STREET
MILWAUKEE 10, WISCONSIN

MANUFACTURERS OF "HI-EFF" Hydraulic Dynamometers
Static Balancing Machines—Sensitive Drilling Machines

FOR BETTER CONTROL OF PRODUCT OR PROCESS...

22 BRANCH OFFICES

Baltimore 5
Buffalo 3
Cleveland 15
Detroit 8
Kansas City 2
New York 17
St. Louis 12
Birmingham 3
Chicago 5
Dallas 1
Glendale 1
Minneapolis 2
Philadelphia 23
San Francisco 7
Tulsa 6
Boston 16
Cincinnati 2
Denver 4
Houston 6
Newark 6
Pittsburgh 22
Seattle 1

...to serve you faster!

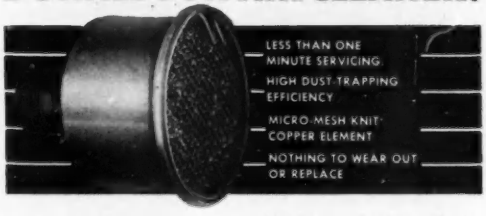
Whatever the problem...if it's concerned with CONTROLS...in heating, refrigeration, aircraft or industrial processing...there's a better solution at General Controls. For General Controls actually do more and cost less. So if you have a product or process where control is vital...check with any of the 22 conveniently located General Controls Branch Offices for better results...*faster!*

GENERAL CONTROLS

801 Allen Avenue, Glendale 1, California

Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls

NEW! Low Cost *Micro-Mesh* DONALDSON AIR CLEANER!



No Tools Required for Servicing
To service, squeeze snap ring together with fingers, removing ring and outer screen. Lift out element . . . wash in kerosene or other solvent. Re-oil and re-insert in cleaner body and replace screen and snap ring. Body of air cleaner need not be removed.

Efficient . . . compact . . . simple to attach and service . . . the new Donaldson Micro-Mesh air cleaner meets every qualification for installations where air requirements are moderate, yet its cost is less than that of oil-washed types. It filters efficiently at any angle, simplifying design problems. Dust entering cleaner is trapped on an oil-wetted filter element, knit from a continuous strand of crimped copper ribbon. Uniform in density, the filter element is placed in the deep-drawn, terne-plate body under slight compression. It will not break down, shift or sag.

Sample Cleaner Sent On Request

DONALDSON COMPANY INC.

666 PELHAM BLVD. • ST. PAUL 4, MINNESOTA

RUBBER . . . with a backbone of STEEL

LORD BONDED-RUBBER Products Solve Some of Industry's Toughest Design Problems

Natural or synthetic rubbers permanently bonded to metal give the imaginative engineer a new tool with which to build better products. The strength, ease of attachment, and adaptability of metal parts is combined with the flexibility and resiliency of rubber. LORD's specialty is the production of Bonded-Rubber Parts to unusually close tolerances of dimensions and performance.

Typical LORD Bonded-Rubber Parts

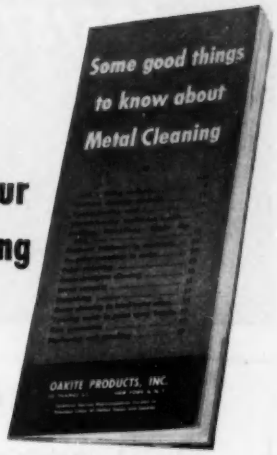
- Vibration-Control Mountings
- Precision Diaphragms
- Valve Seals
- Torsion Joints
- Friction Drive Wheels
- Motor Mounts
- Bearing Seals
- Shock Cushioning Devices
- Pump Impellers
- Flexible Couplings
- Special-Purpose Components

When special Bonded-Rubber Parts are indicated, LORD engineers will assist you to design them for most economical production . . . longest service life . . . maximum performance. Get LORD's quotation on your present requirements for Bonded-Rubber Parts—you will be pleased with both the quality and the price. For specific information write to attention of Product and Sales Engineering Department.

LORD MANUFACTURING COMPANY, ERIE, PA.
Canadian Representative: Railway & Power Engineering Corp. Ltd.

LORD — Vibration-Control Mountings . . . Bonded-Rubber Parts

Which of your metal-cleaning jobs would you like to improve?



Listed below are some of the operations discussed in Oakite's new 44-page handsomely illustrated booklet on Metal Cleaning. Please check the list. Then let us show you how Oakite materials and methods can give you better production with greater economy.

OAKITE PRODUCTS, INC.
28A Thames St., New York 6, N. Y.

Tell me (without obligation on my part) about Oakite methods and materials for the following jobs:

- ☐ Tank cleaning
- ☐ Machine cleaning
- ☐ Electrocleaning
- ☐ Pickling
- ☐ Pre-paint treatment
- ☐ Paint stripping
- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
- ☐ Rust prevention
- ☐ Send me a FREE copy of your booklet "Some good things to know about Metal Cleaning"

NAME.....

COMPANY.....

ADDRESS.....

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada

Women, especially, pay close attention to the interior trim of your car — and they quickly appraise the excellent quality of Col-O-Vin plastic coated fabrics. Let us show you how perfectly our technicians and design-and-color stylists can work out your requirements with Col-O-Vin.

COL-O-VIN

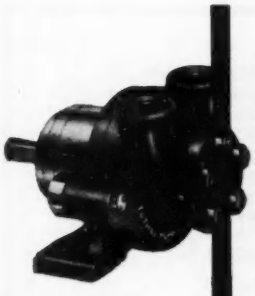
Call us for information about this splendid product that is supplied in volume to motor car and seat cover manufacturers.

COL-O-VIN—*plastic coated fabrics*
COL-O-TEX—*pyroxylin coated fabrics*

COLUMBUS COATED FABRICS CORPORATION
Main office and factory, Columbus 16, Ohio
New York, Detroit, Chicago, San Francisco, Los Angeles

Quality Coated Fabrics for

- UPHOLSTERY
- HEADLININGS
- DOOR PANELS
- CARPET BINDINGS
- WELTING
- GENERAL TRIM



IN PRESSURE LUBRICATION

ON HYDRAULIC MECHANISMS

FOR FUEL OR LIQUID TRANSFER

THIS SMALL PUMP CAN DO BIG THINGS FOR YOU

It's the Tuthill Model L . . . a positive displacement, internal-gear rotary pump with the famous Tuthill mechanical seal. Capacities up to 3 g.p.m. at pressures to 400 p.s.i. Ring or foot mounting. Many porting arrangements. Write for Model L bulletin.

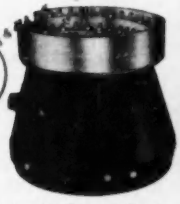
TUTHILL PUMP COMPANY
939 East 95th Street, Chicago 19, Ill. Phone: REgent 4-7420

SYNTRON PARTS FEEDERS

Provide Automatic Oriented Position Single Line Feeding

Controlled vibration moves the parts up and around the spiral track, where selectors orient the parts to the desired discharge position . . and at a rate desired.

No loss of small, valuable parts due to mishandling . . no fumbling or bungling . . it's only necessary to fill the bowl, the feeder does the rest.



Send us samples of your small parts . . our Engineering Dept. will make tests and submit recommendations and quotations

Write to - -

SYNTRON CO.
195 Lexington Ave. Homer City, Pa.

Index to

The Advertisers' Index is published of the advertising contract. Every rectly. No allowance will be made

Advertisers

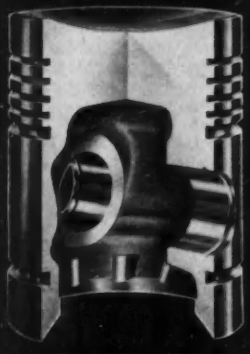
as a convenience, and not as part care will be taken to index cor- for errors or failure to insert.

ENGINEERING
COOPERATION
PRODUCTION
"KNOW-HOW"

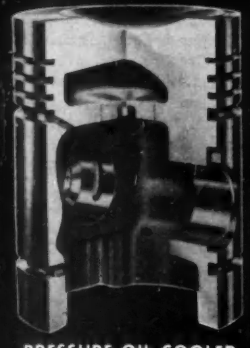
PISTONS

EXPERTLY DESIGNED
PRECISION-MADE
Specifically for Your
DIESEL
ENGINE

ORIGINAL EQUIPMENT IN AMERICA'S FINEST MOTORS -
WAUKESHA
HERCULES
ENGINES
FWD
TWIN COACH
IHC
HALL-SCOTT
BUDA
CUMMINS
MARMON-
HERRINGTON
GMC MACK
CORBITT
DIAMOND-T
REO
CONTINENTAL
SEAGRAVE
FEDERAL



CONDUCTION COOLED



PRESSURE OIL COOLED

SERRATED FINISH

ZOLLNER

PISTON EQUIPMENT *for* INTERNAL COMBUSTION ENGINES —BOTH GASOLINE AND DIESEL

ZOLLNER MACHINE WORKS
FORT WAYNE, INDIANA

"Makes Any Engine a Better Engine"

For dependability, for safety, for perfect performance, Everlock Washers always win with flying colors!

Johnnie Parsons

AND AGAIN IN 1950

(FOR THE ELEVENTH CONSECUTIVE TIME)

ON THE WINNING CARS AT INDIANAPOLIS

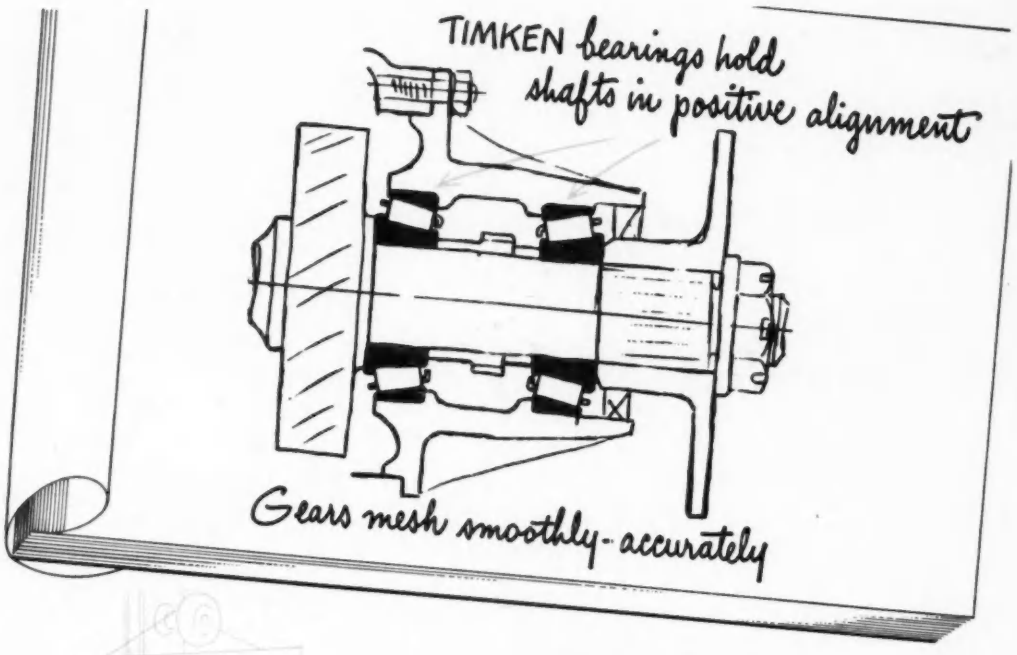
Everlock WASHERS

The 1950 Indianapolis 500-Mile Sweepstakes—fastest ever run on this great proving grounds—saw every winning car equipped with *Everlock* Washers!...What a great testimonial to the stamina, the dependability and the built-in *safety* of *Everlocks!*

Surely, it's no mere coincidence that the world's leading racing drivers—men who risk their very lives behind the wheel—insist on *Everlock* Washers! It's no happen-stance that the cars placing 1-2-3 in the Indianapolis Sweepstakes for the past eleven consecutive years have used *Everlock* Washers as safeguards against loose nuts, bolts or screws.

Everlock's exclusive features—*wide chisel edges, combined with powerful spring tension* — are proving their superiority wherever lock washers are needed. In your own assemblies you'll find that Everlock Washers will reduce both service and production costs. Result: *Increased profits!*

THOMPSON-BREMER & COMPANY
1642 West Hubbard Street, Chicago 22, Illinois
In Detroit: SAM T. KELLER COMPANY, 2457 WOODWARD AVE.

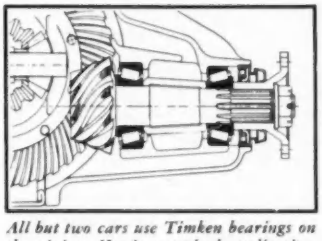


Silence . . . is a good rule for your new transmission, too!

HOW to give new car buyers the smoother, quieter flow of power they demand? Plan now to include Timken® bearings in the secret transmission you're working on. Timken tapered roller bearings hold shafts in rigid alignment. Deflection and end-movement are eliminated. Where gears are used, Timken bearings keep them meshing smoothly and accurately. Wear on moving parts is reduced to a minimum, assuring long, quiet, trouble-free operation.

The tapered design of Timken bearings enables them to carry both radial and thrust loads in any combination. Thrust bearings or washers are unnecessary. And since Timken bearings can be adjusted permanently at installation, wider machining tolerances can be allowed.

For an idea of what Timken bearings can mean to your transmission, consider what they're doing for pinions—the toughest job of them all! Recently two more manufacturers switched to Timken bearings. Now all but two automobile makers use them in this vital application.



All but two cars use Timken bearings on the pinion. Here's a typical application.

Throughout the history of the automobile industry, Timken bearings have solved some of the most difficult problems. Fifty years of experience in bearing research and development are at your disposal for information and help. Feel free to use our complete engineering facilities. In Detroit, phone TRinity 5-1380. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

NOTE TO P. A.'S. *Because every step of the manufacture of Timken bearings is controlled within our company . . . because our vast manufacturing facilities are widely dispersed . . . you will find The Timken Roller Bearing Company a supply source of outstanding reliability.*

TIMKEN

TAPERED ROLLER BEARINGS

NOT JUST A BALL — NOT JUST A ROLLER — THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST — LOADS OR ANY COMBINATION